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# ROADS AND STREETS

SEPTEMBER 1949

BRIDGES  
ROADS  
CONSTRUCTION

WHEN THE  
SNOW FLIES—  
THE SNOW *flies!*

Manufactured by J. D. Adams Manu-  
facturing Company, Indianapolis, Ind.

Yes, the snow flies—*fast* when Timken  
bearing equipped snow plows get busy!

This photograph is reminiscent of the days when old man winter spreads  
his fleecy white blanket wide and deep. It shows an Adams No. 610 Motor Grader equipped with an Adams Rotary Snow  
Plow giving the snow the old "one-two"!

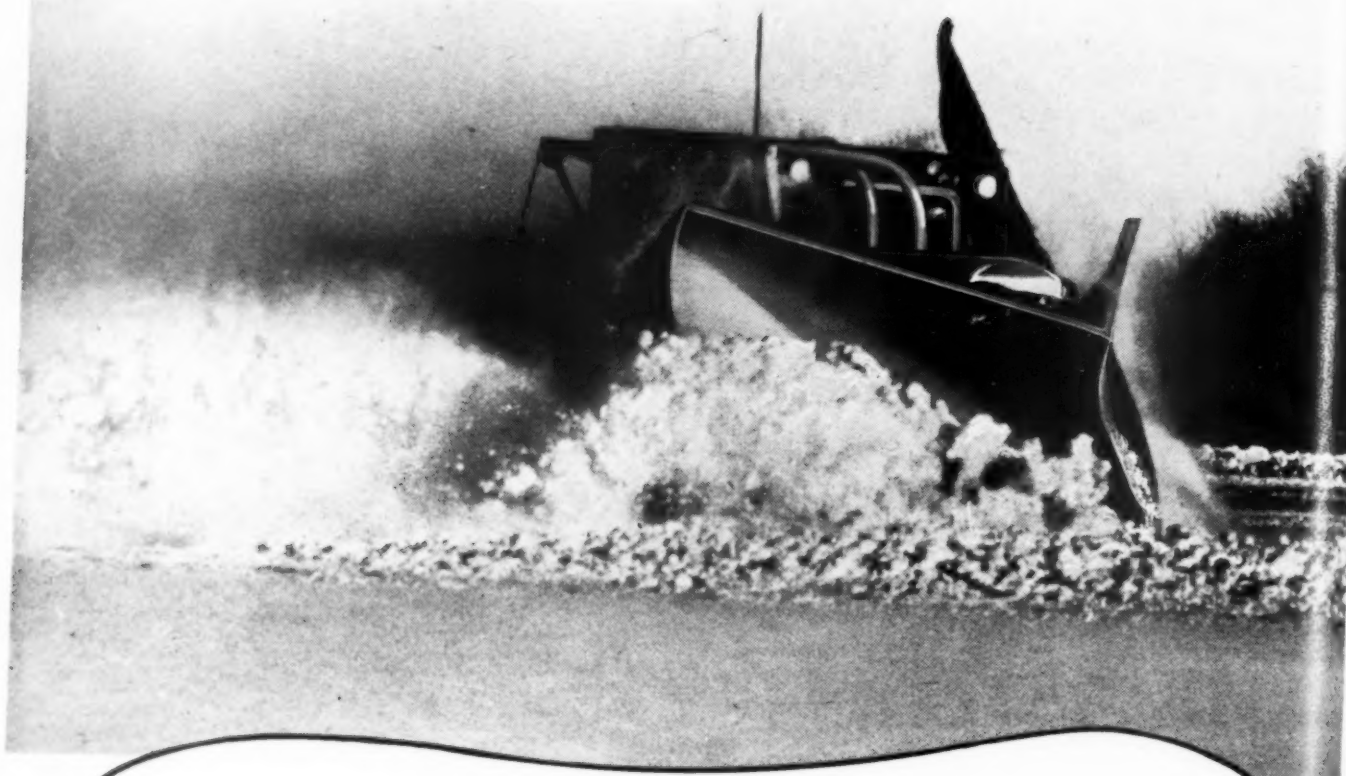
Adams motor graders have used Timken tapered roller bearings for many years. The Adams snow plow uses them too  
—and for the same reasons: to eliminate friction and wear; to assure smooth operation; to carry all loads — radial, thrust  
and both together; to hold moving parts in alignment; to simplify lubrica-  
tion; and to reduce maintenance and lengthen equipment life. Adams knows  
it pays — and so do users of their equipment. Look for the trade-mark  
"TIMKEN" on every bearing in the equipment you make or buy. The Timken  
Roller Bearing Company, Canton 6, Ohio. Cable address "TIMROSCO".

**TIMKEN**  
TAPERED ROLLER BEARINGS



NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

**250 HP. WALTER SNOW FIGHTER** with giant V-Plow and two hydraulically controlled side wings. Total clearing width 28 ft. at 20-30 mph.



## No other snow removal equipment can match **WALTER SNOW FIGHTERS**

—**IN SPEED.** 20-30 mph. sustained clearing speeds throw snow far off road, clear more miles per hour.

—**IN POWER.** 150-250 hp. engines provide tremendous power for any emergencies.

—**IN TRACTION.** Four-Point Positive Drive provides 100% traction in four driving wheels; no side-slipping or stalling.

—**IN RUGGEDNESS.** Specially designed and built for the gruelling demands of snow removal.

—**IN VOLUME.** Mount bigger plows and wings; displace greater volume of snow on each run; make widening out easier.

—**IN VERSATILITY.** Handle any winter conditions . . . high speed plowing—drift busting—scraping hard-packed snows—spreading sand and chemicals for ice control.

—**IN SAVINGS.** Cut your clearance cost per storm; keep roads open and traffic moving; reduce community losses.

**WALTER**  
4-POINT POSITIVE DRIVE  
**SNOW FIGHTERS**

**GET THE FACTS! PLACE ORDERS NOW!**

- Have your Walter dealer explain the advantages of the Walter Four-Point Positive Drive and other features. Write us for detailed literature. Act now to insure early delivery.

**WALTER MOTOR TRUCK CO.**

1001-19 Irving Ave.  
Ridgewood 27, Queens, L. I., N. Y.



Midget Speedway at Indianapolis, Ind., has Safety-Beam installed around circumference of track. Contractor: James H. Drew Corp., Indianapolis, Ind.



## WHERE DANGER LURKS... THAT'S THE PLACE FOR SAFETY-BEAM



Safety-Beam installed on new approach to famous Pulaski Skyway, near Newark, N. J. Contractor: S. J. Groves & Sons Co., Woodbridge, N. J.



Safety-Beam protects motorists using this bridge on Glenville-Baxley Road, in Georgia. Contractor: Scott Construction Co., Thomasville, Ga.

Wherever there's a danger point along a highway — a sharp turn, embankment, bridge approach or other source of hazard — that's the place for Bethlehem Safety-Beam Guard Rail.

Bethlehem Safety-Beam Guard Rail is ideal for protecting traffic because of its strength and ability to absorb impact. The rail consists of heavy sections of steel plate in a channel-type design, bolted together on either steel or wood posts to form a continuous, impact-absorbing beam. What happens when a vehicle strikes Safety-Beam? Impact is absorbed by several adjacent posts, rather than one post, thus making it next to impossible for the vehicle to break through the rail.

Safety-Beam Guard Rail is easily visible day and night. It normally comes in 12 ft, 6 in. lengths, but is also furnished in lengths up to 50 ft. It can be installed economically, even by unskilled labor, for it fastens to the post with only one bolt. No end anchor rods, special tools or complicated adjustments are required.

Folder 545 shows standard details and assembly plans for Bethlehem Safety-Beam Guard Rail. Write for a copy.

**BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.**

*On the Pacific Coast Bethlehem products are sold by  
Bethlehem Pacific Coast Steel Corporation*

*Export Distributor: Bethlehem Steel Export Corporation*

## STEEL FOR HIGHWAYS

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Hollow Drill Steel • Spikes • Bolts and Nuts • Pipe  
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Timber Bridge Hardware • Tie-Rods



# ROADS AND STREETS

September, 1949 • Vol. 92 • No. 9

With Roads and Streets Have Been Combined Good  
Roads Magazine and Engineering & Contracting

E. S. GILLETTE, Publisher



HALBERT P. GILLETTE, Editor-in-Chief

## Coming Articles

### Bituminous Paving Practice

October "Feature." Look for—"Repair

Methods of Air Forces' Roving Runway Crew," by one of the men in charge. One or more "how it was done" articles on black-top road jobs of real interest—emulsion project; travel plant job; hot-mix resurface.

Summary of the Corps of Engineers' research on asphalt paving mixtures.

### Earth Moving

No comment. But 1949 saw many remarkable jobs! R & S reports coming along.

### Rock Excavation

The R & S "Feature" for November. Watch for report on rock road job methods in Virginia, Pennsylvania, and elsewhere . . . a summary of methods used on TVA dams involving huge blasts of 500,000 to 1,300,000 lb. explosives.

### The Pennsylvania Turnpike

Biggest project of the year, the work on the new 100-mile extension into Philadelphia is ahead of schedule. A pictorial progress review.

### City Engineering

Notes on the Public Works Congress in Kansas City.

### Concrete Paving

How three contractors teamed up on the Detroit Wayne Major Airport . . . With M-K on the Boise Airport improvements.

### Bridge Jobs

Sorry, none this month. Watch for construction methods reports on Santa Rosa Sound bridge at Pensacola, the Turtle River bridge at Brunswick, Ga., the new structure at Richmond, an overpass at New Orleans.

Contractors and the superintendents . . . officials and engineers . . . something for all in each issue of "Roads and Streets". Watch for your next copy. Practical "how it was done" articles invited from readers.

HAROLD J. McKEEVER, Editorial Director  
C. T. Murray, Managing Editor  
Col. V. J. Brown, Associate Editor  
S. A. Phillips, Field Editor  
H. K. Glidden, Contributing Editor  
P. V. Jones, Production Editor

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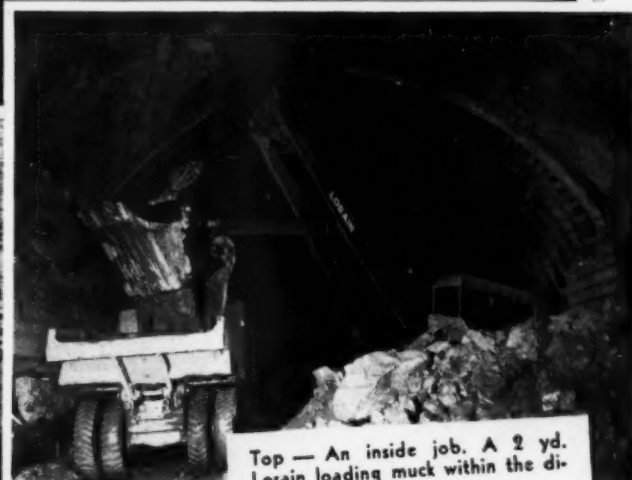
A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

Gillette Publishing Company, Publication  
and Editorial Offices, 22 West Maple  
Street, Chicago 10, Ill.

Chicago Office..... H. J. Conway, Advertising Manager, 22 W. Maple St.  
R. T. Wilson  
F. H. Bowes  
E. Bender  
M. B. Nylund  
New York Office..... H. D. Crippen, Manager, 155 E. 44th St.  
Cleveland Office..... Lee B. McMahon, Manager, Leader Building  
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1709 W. 8th St.

Acceptance under Act of June 5, 1934. Authorized April 16, 1948, at Mount Morris, Illinois. Published monthly. Subscription price \$5.00 per year.

# Downsville Dam... NEW YORK'S \$52,000,000 *DRINK OF WATER*



Top — An inside job. A 2 yd. Lorain loading muck within the diversion tunnel.

Center — A Lorain Moto-Crane erects steel for east portal of diversion tunnel.

Lower Left — A Lorain-820 crane hoisting concrete buckets on one of the dam structures.



Downsville Dam, in the foothills of the Catskills, is part of a current \$52,000,000 project so New York's millions will have more water "on tap." The \$13,000,000 Downsville Dam is being done by Walsh Constr. Co. (Davenport, Ia. and New York) and B. Perini & Sons (Framingham, Mass.). For years both of these names have been associated with many of the nation's biggest jobs . . . and where they've gone, so have Lorains. Between them they've purchased 49 Lorains — 25 for Walsh, 24 for Perini. Such proof of owner satisfaction is repeated again and again with contractors — large and small — all over the nation. Find out why successful contractors, who once they experience Lorain performance, keep repeating on Lorains. Just ask your nearest Thew-Lorain distributor for facts, figures and proof!

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**ROADSIDE REPORT** by Bert Snooks, owner of the Texas Hauling Company, Houston, Texas, G.V.W. ratings for Ford F-7's and F-8's shown are 19,000 lbs. and 21,500 lbs. respectively.

## "The FORD BIG JOB is more rugged, in my opinion, than any other truck made!"

"I THINK the Ford 145-H.P. BIG JOB is the best all purpose truck on the market," reports Bert Snooks. "I am operating three Ford F-8's and four F-7's with eight-yard bodies. These seven BIG JOBS are doing a better job than fourteen 2-ton trucks with four-yard bodies that I operated in 1947. My Fords have from 15,000 to 100,000 miles and the cost of repairs has been negligible. The Ford BIG JOB is more rugged, in my opinion, than any other truck made."

In terms of *Payload-Performance* the Ford BIG JOBS have no equal in their class. No other truck offers so much payload capacity in relation to chassis weight, with as high a horsepower rating per gross ton. This means bigger payloads within legal load limits. It means faster, more profitable delivery of big loads. Ford's high *Payload-Performance* is evidence of Bonus Built construction. Each of over 150 Ford Truck models is Bonus Built . . . built extra strong to last longer.



### BUILT STRONGER TO LAST LONGER

USING LATEST REGISTRATION DATA ON 6,106,000 TRUCKS, LIFE INSURANCE EXPERTS PROVE FORD TRUCKS LAST LONGER!

## ONLY THE FORD BIG JOB HAS ALL THESE FEATURES

- ★ New 145-h.p. Ford V-8 engine for top performance.
- ★ Ford concentric dual-throat carburetor for more power, more economy.
- ★ New heavy duty 5-speed transmissions—overdrive or direct-in-fifth—for operating flexibility.
- ★ Big Ford power-operated hydraulic brakes; front 16-inch by 2 1/4-inch; rear 15-inch by 5-inch double cylinder on F-7, 16-inch by 5-inch double cylinder on F-8. Air brakes also available for F-8.
- ★ Ford Super Quadrax single speed axles; two-speed axle available in Model F-8.
- ★ Large diameter (10-inch) wheel bolt circle with 8 studs to allow for extra-strong hub construction.
- ★ Million Dollar Cab with Ford Level Action suspension for greater driving comfort.
- ★ Nationwide service from over 6,400 Ford Dealers.
- ★ Ford Bonus Built construction for long truck life.

Gross Vehicle Weight ratings: F-8 up to 21,500 lbs., F-7 up to 19,000 lbs. Gross Combination ratings: F-8 up to 39,000 lbs., F-7 up to 35,000 lbs.

CRAWLERS  
PLUS

# POWER

Here's a case where engine power meant money. The smooth operation and high power of Northwest engine equipment and Northwest crawler equipment saved hours of time on this job at Davis Dam. Northwest ability to negotiate this 30° slope meant the difference of getting the machine on the new location quickly or a 3 mile trip.

Northwest equipment brings you the power and versatility to meet tough conditions on tough jobs with the minimum of lost time.

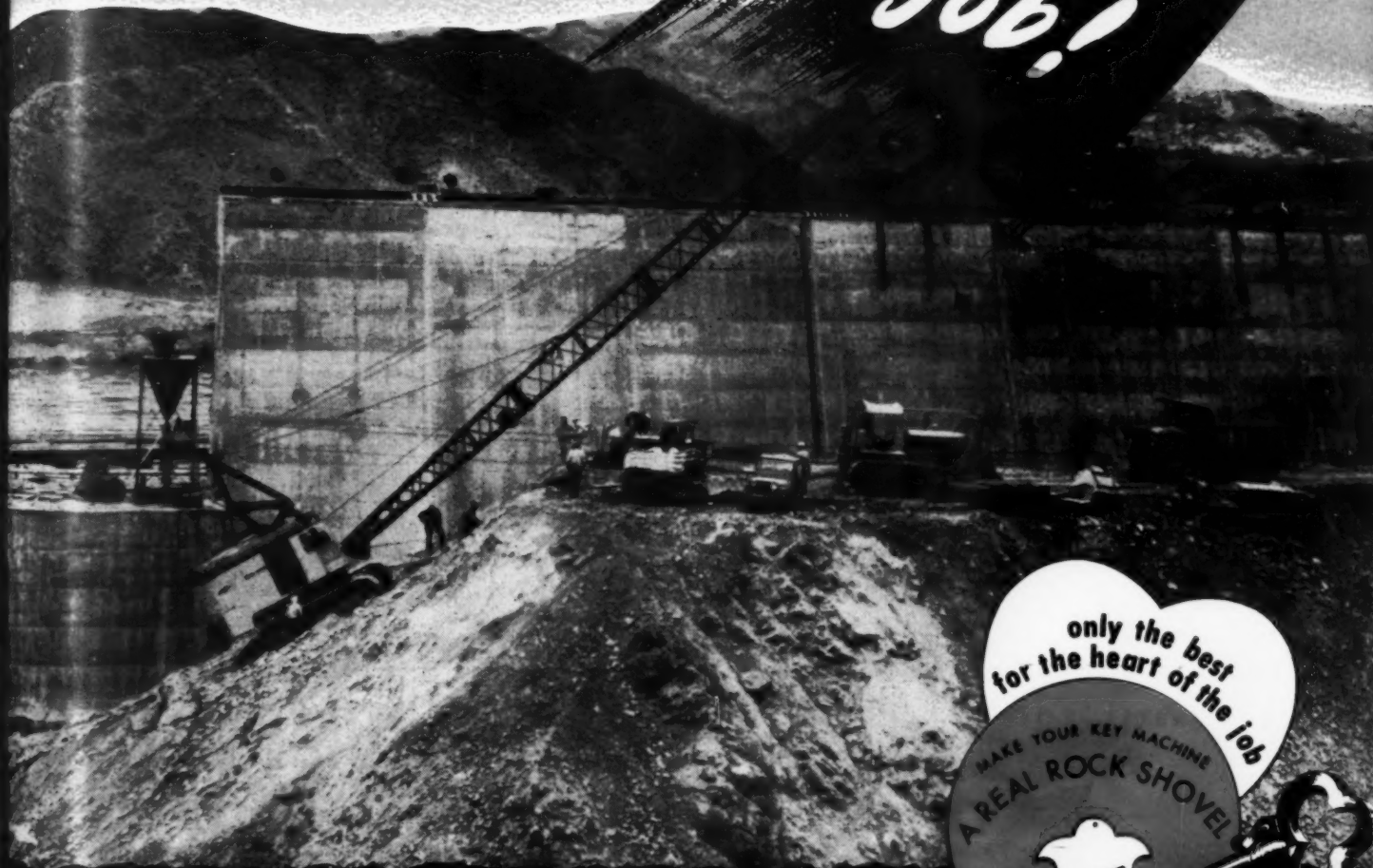
It is just another of the many advantages that make one out of every three Northwests a repeat order.

You can't afford anything but the best for the heart of the job. Plan ahead now to have a Northwest in the *Key Spots!* Let us tell you how.

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*to  
meet  
TOUGH  
conditions  
on the  
job!*



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CRAWLER AND TRUCK MOUNTED SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

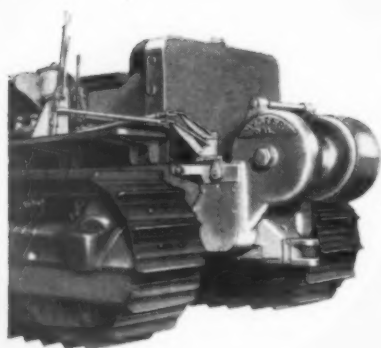
*only the best  
for the heart of the job*

MAKE YOUR KEY MACHINE  
A REAL ROCK SHOVEL

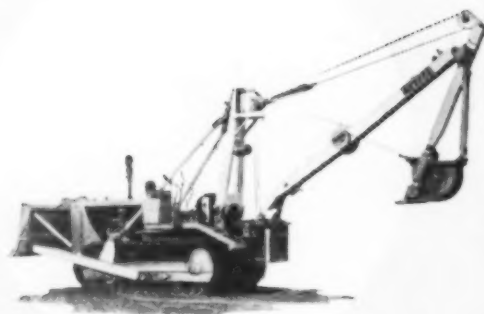
PROFIT

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# Another New Hyster Tractor Tool



TOWING WINCHES



HYSTAWAY BACK HOE

**THE HYSTER GRID ROLLER**—As a *high-speed, high-efficiency* earth-compaction machine, the new Grid Roller has **NO EQUAL. COMPACTS BETTER—WITH FEWER PASSES—CAN BE TOWED AT HIGHER SPEEDS.** (Airports, dams, levees, fills, road building, and on all earth compacting projects.)

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For 20 years Hyster has been building Tractor Tools for Greater Work Production. For 20 years "Caterpillar" distributors have sold them.

The current line of 29 tractor tools includes towing winches, yarders, donkeys, cranes, logging arches, sulkies, Hystaway (combining clamshell, dragline, back hoe and crane)...and the *new* Hyster Grid Roller. Contact your "Caterpillar" distributor. Write for catalogs.

## HYSTER® COMPANY



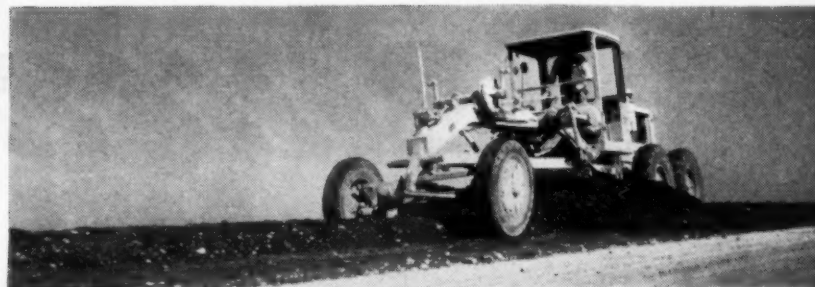
2995 N. E. Clackamas St. . . Portland 8, Oregon

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This unit has hydraulically controlled bottom-door dumping (for any size windrow); booster hydraulic steering; air brakes; big low-pressure tires (for off-road hauling under severe conditions).



On the operation shown here (Fresno County, Calif.), black top from an abandoned army airport is hauled up to 10 miles with high-speed 14-cu.-yd. "Caterpillar" DW10s and W10 Wagons. Big loads like this, moving at truck speeds, spell economy on any county road job. A "Caterpillar" No. 12 Motor Grader blades the final grade and spreads the windrowed material.

With teamwork like this—on most any kind of a setup—new roads virtually "unroll" before one's eyes—and their relatively low cost is something any public official can be proud to publicize.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

# CATERPILLAR

DIESEL ENGINES • TRACTORS • MOTOR GRADERS  
EARTHMOVING EQUIPMENT

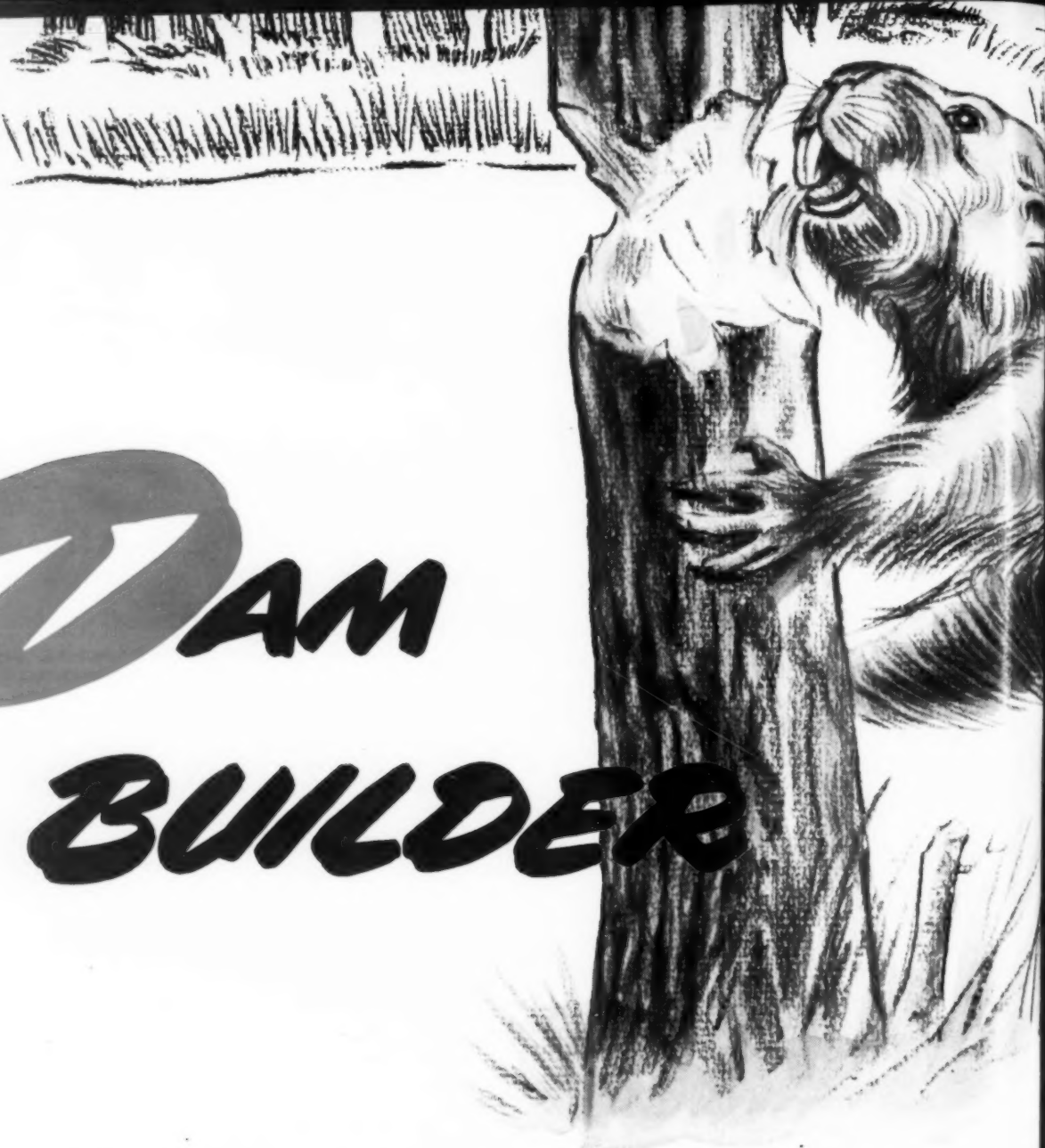
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CATERPILLAR TRACTOR CO., Dept. RS-9, Peoria, Illinois  
Send booklet, "DW10s in Action."

Name \_\_\_\_\_

Firm Name \_\_\_\_\_

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Matchless ability to hang on to a load and put dirt where you want it *fast*—that's the kind of performance you get from International Diesel Crawlers on any earthmoving job. *Built to outperform*, to dig in and do, with diesel power that *exceeds* today's exacting requirements!

Quick to get to work; with in-built, all-weather starting—and quick to do the work; with 8 speeds ahead, 8 in reverse and

finger-tip speed and steering control—International TD-24 turns in record after record of unbeatable work performance.

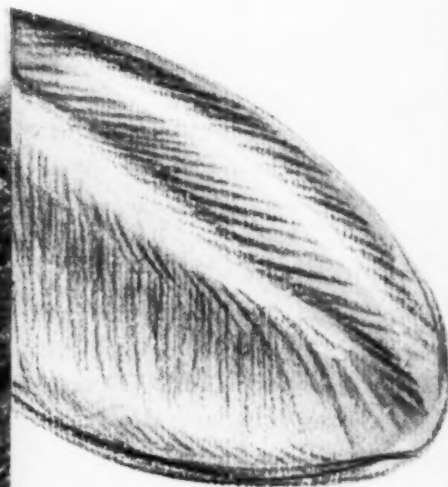
On dams for soil conservation as well as the great flood-control and hydro-power earthworks, this modern, diesel crawler is the tractor to use for all your tough jobs. Contact your International Industrial Power Distributor for TD-24's now.

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Standardize  
on Power  
that Pays

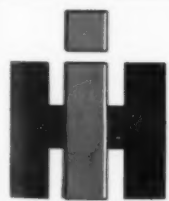
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This International TD-24, with 140 horsepower at the drawbar, delivers a bladeful of heavy clay with

ease and precision at the crest of an earth dam in Illinois. Increase your work capacity with a TD-24.



INTERNATIONAL  
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# INTERNATIONAL INDUSTRIAL POWER





# **C TOURNAPULLS** average **ON 650'**



## ***Moss Construction Co.* buys additional Tournapull as result of experience on 160,000-yard airport job**

**M**oss Construction Company of Paris, Illinois, brought in two C Tournapulls to handle 100% leveling job at Logan County Airport near Lincoln, Illinois. Project called for grading 160,000-yard airport site preparatory to paving. Cuts and fills were scattered over entire area . . . with one-way hauls ranging anywhere from 50 to 1000'. Because of the project's sprawling nature, no haul roads were established. Despite the scattered cuts and fills and lack of haul routes, the two "C's" chalked up the following production performance.

### **Moved 1½ total yardage in first 17 days**

Working in topsoil and clay on average 650' one-way hauls, Moss Construction Company's production figures showed the two C Tournapulls moved 80,000 yards in the first 17 work-

ing days! That's an average of over 4,700 yards per 10-hour day. Even in wet going the "C's" delivered consistently. Checked by Mr. Moss after a heavy rainfall, the two C Tournapulls moved 1,450 pay yards of wet clay in just 3 hours . . . had the 6-week job 50% completed in the first 17 working days.

### **Drove 233 miles in 12 hours**

When Moss Construction Company got this airport job, they drove the two rubber-tired "C's" over highways under their own power from Benton, Ill. Covered a distance of 233 miles in 12 hours. On basis of this typically outstanding all-around performance, Moss has purchased another C Tournapull. "Finest piece of dirtmoving equipment I ever used," is the way Contractor Moss put it.

You, too, will find these same Tournapull production advantages are available for your jobs



**See your Le Tourneau Distributor  
NOW for complete information**

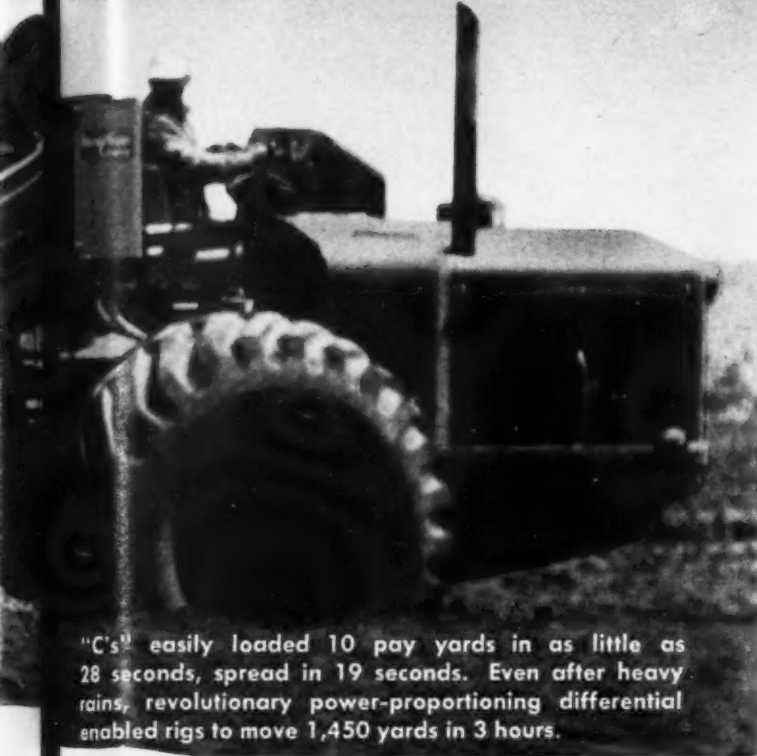
"C's" e  
28 sec  
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dozers.

Positive p  
electric c  
enabled  
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ETC  
MORE

# e over 4,700 pay yards per day D'HAUL...



"C's" easily loaded 10 pay yards in as little as 28 seconds, spread in 19 seconds. Even after heavy rains, revolutionary power-proportioning differential enabled rigs to move 1,450 yards in 3 hours.



Giant, 21.00 x 25, low-pressure tires gave extra compaction on the fill . . . reduced roller finishing time. Large ground contact area of wide tires lets you move anywhere, without damage to flight strips, pavement.



Operators liked the electric, finger-tip switches on dash panel . . . kept pay yards moving to the fill without let-up, because they weren't half as tired with easy-to-operate electric control.



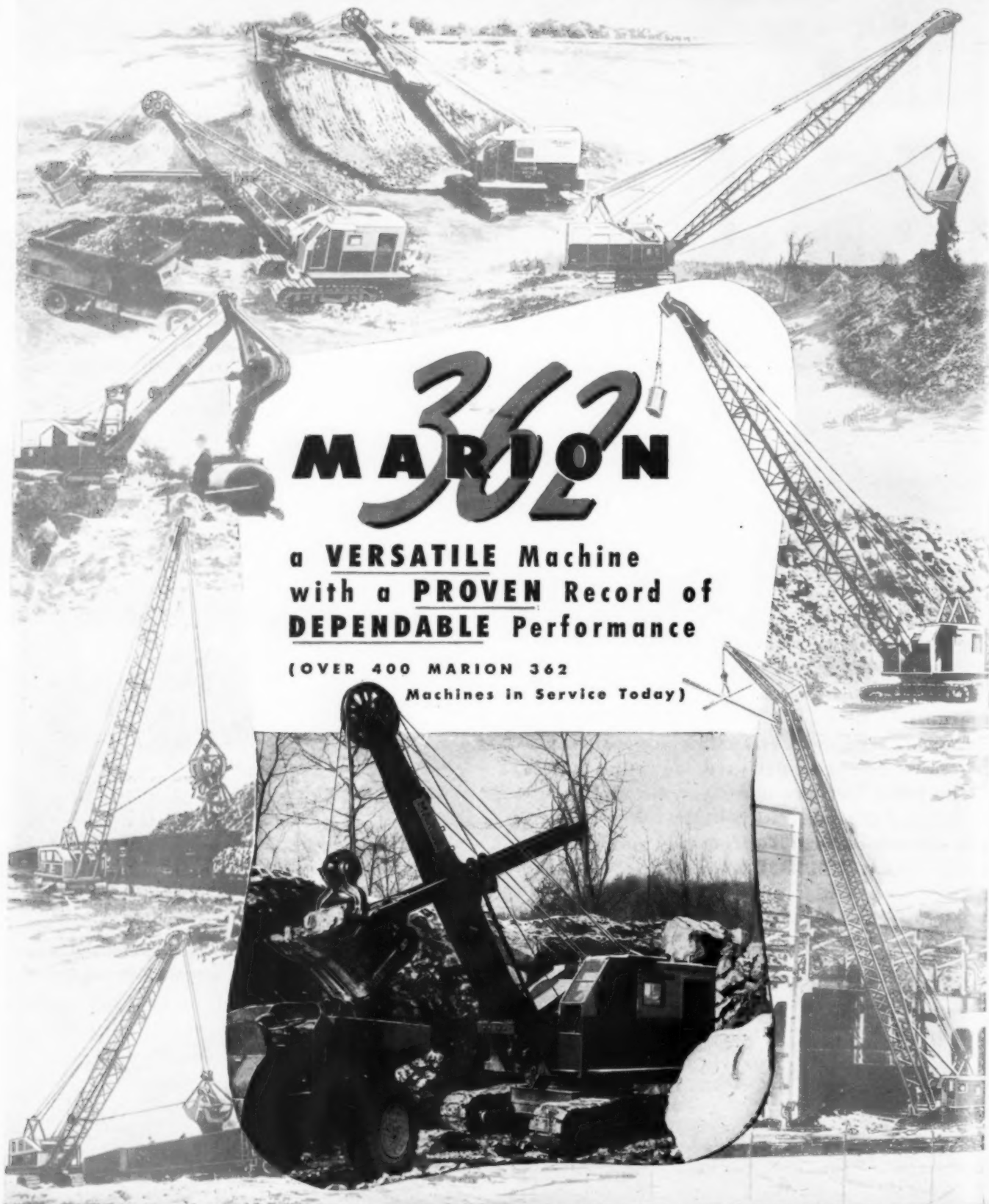
Positive power steer, 90 degree turns, plus finger-tip, electric control all contributed to fast cycle time . . . enabled Moss to chalk up such a marvelous production performance with only 2 C Tournapulls.

Tournapull, Tournadozer—Trademark Reg. U.S. Pat. Off. R158

## LETOURNEAU **TOURNAPULLS**

ORE YARDS PER HOUR WITH RUBBER-TIRED POWER





# 362 MARION

a VERSATILE Machine  
with a PROVEN Record of  
DEPENDABLE Performance

(OVER 400 MARION 362  
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# OVER ROUGH JAGGED ROCKS—IN MUD, GRAVEL, SAND—ON SMOOTH HIGHWAYS— *Generals meet all requirements*

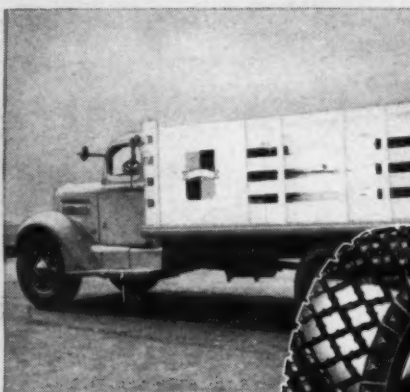


Where you have to go in off-the-highway to get the load, bring it out and over the road, use the *General H. C. T.* The sturdy, zig-zag tread digs deep for more traction in toughest going. Carries loads faster, safer, cheaper over the highway.

Where the job calls for most work off-the-highway use the *General L. C. M.* Tremendous lugs of rubber, designed in a self-cleaning tread, take bruising punishment under toughest conditions; carry the load over-the-highway smoother, safer, faster, cheaper.



**General Tractor Grader Tire.** Thick lugs of rubber set high on a sturdy carcass develop extra drive-wheel traction. Deep-ribbed General Ribbed Grader for front or trailing wheels steer easier, forward or backward.



For utility trucks choose the sturdy *General All-Grip* truck tire. Extra-deep, extra-thick tread blocks develop fast, self-cleaning action for more traction on mud and gravel roads—smooth rolling on the highway.



THE GENERAL TIRE & RUBBER CO., AKRON, OHIO

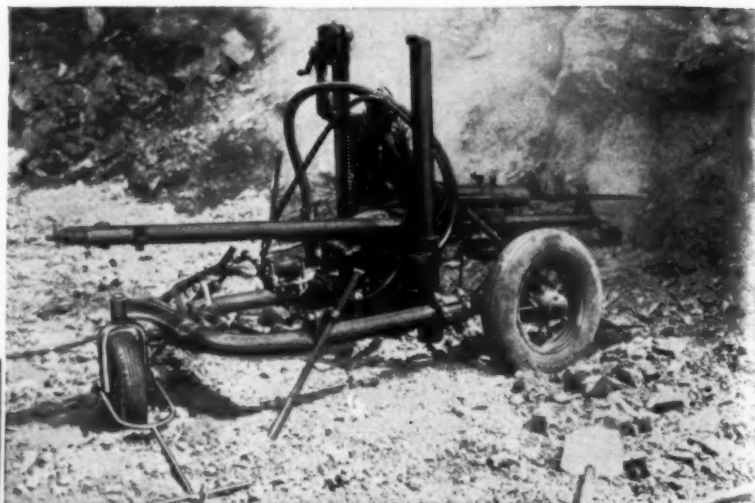


### for faster sawing

New CP HI-SPEED UNIVERSAL ELECTRIC SAW cuts 25% to 40% faster. Blades available for cutting through nails, copper, brass, bronze, lead, tile, glass, brick, clay products, concrete, marble, flagstone, asbestos, cement products and composition board. Write for SP-3000.

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Drills horizontally, vertically, or at any angle. Readily moved over uneven ground, the lightweight G-200R WAGON DRILL provides fast and easy operation of the more powerful CP drifter drills. Quickly adjustable for toe-hole or bench drilling. Available with CP-50N (3"), CP-60N (3½"), or CP-70 (4") Drifters. Write for complete information.



## 4 time-savers that cut contractors' costs

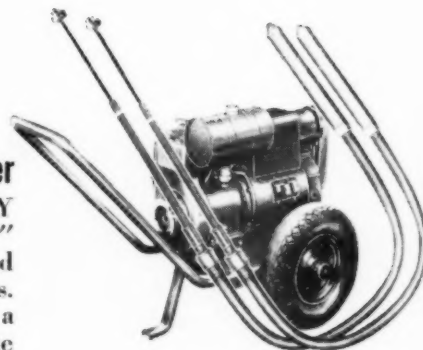


### for the tough jobs

Heavy-duty CP Air Impact Wrench easily runs off — or on — nuts up to 1¼" bolt size. For maintenance as well as construction work; just the wrench for tractor treads and similar heavy servicing jobs. Write for Bulletin 812.

### for vibrating concretes of 2" slump and over

Portable CP-220 HIGH FREQUENCY ELECTRIC VIBRATOR for concretes of 2" slump and over; for walls, columns, floor and roof slabs, precast piles and similar products. Two of these vibrators can be powered by a CP-2KW Gasoline-driven Generator. Write for Bulletin 814.



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General Offices: 8 East 44th Street, New York 17, N. Y.

AIR COMPRESSORS • ELECTRIC TOOLS • PNEUMATIC TOOLS • DIESEL ENGINES  
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"And one important reason is  
their big supply of crude!"

**CHECK OFF ANOTHER REASON WHY OHIO OIL CAN MAKE  
FLEXIBLE, ON-TIME DELIVERIES . . . WITH DAILY ADJUSTMENT  
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✓ Ohio Oil, one of the largest producers of crude in the country, owns and produces all of its own crude. That assures first choice of best asphaltic crudes—assures you of all the top quality asphalt you want, when you want it!

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for all grades of  
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# FOR SIDE STREET OR SUPER HIGHWAY—



## GALION ROLLERS DO A BETTER JOB

GALION is the world's largest manufacturer of rollers — a position achieved thru superiority in design, construction, and performance.

### TANDEM

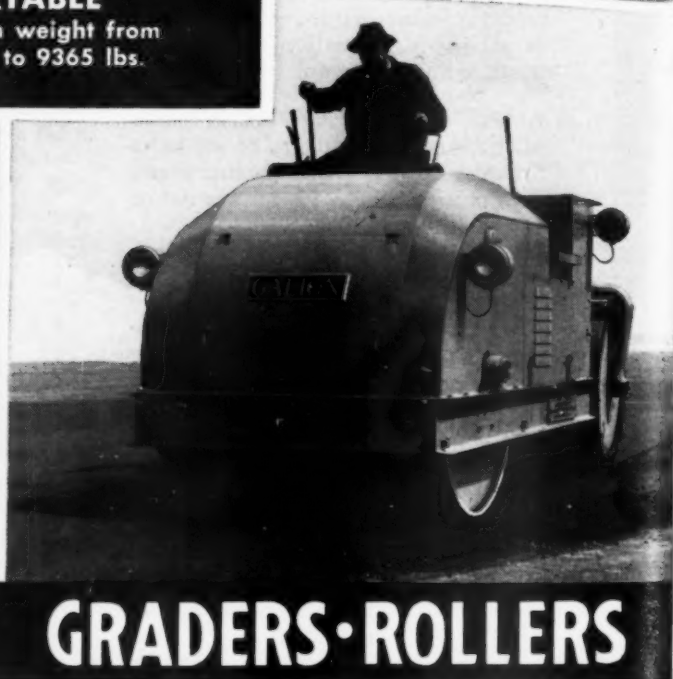
3-5-8 and 10 ton sizes  
Variable weight from 3 to 14 tons

### THREE-WHEEL

6-7-8-10 and 12 ton sizes

### PORTABLE

Variable in weight from  
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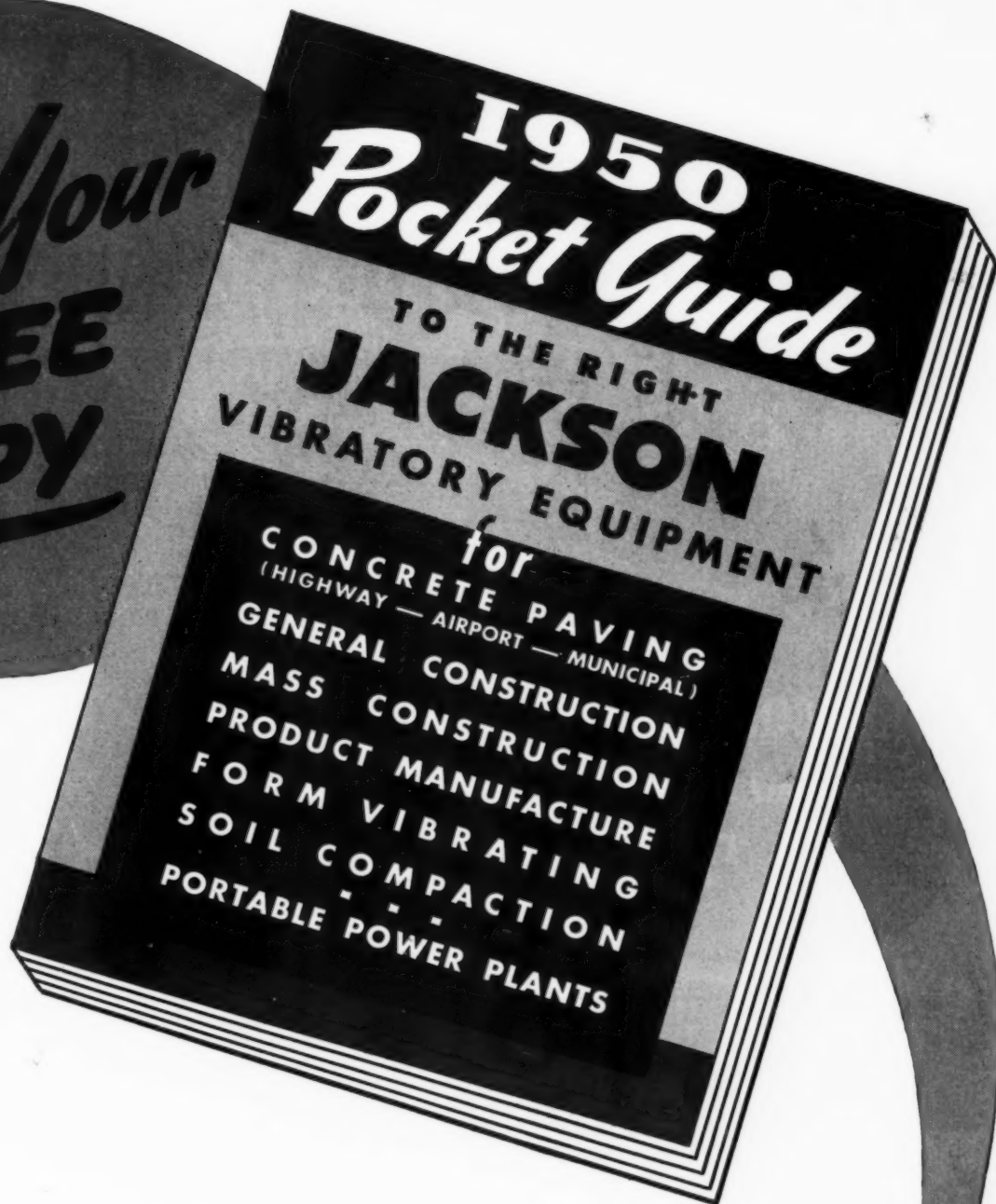
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— proved in Pennsylvania Turnpike

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*Wide extremes of climate and topographical conditions are met in the Pennsylvania Turnpike.*



*In addition to Truscon Welded Wire Fabric in the pavement, Truscon Steel Tunnel Lining Supports were used in the Laurel Hill Tunnel.*

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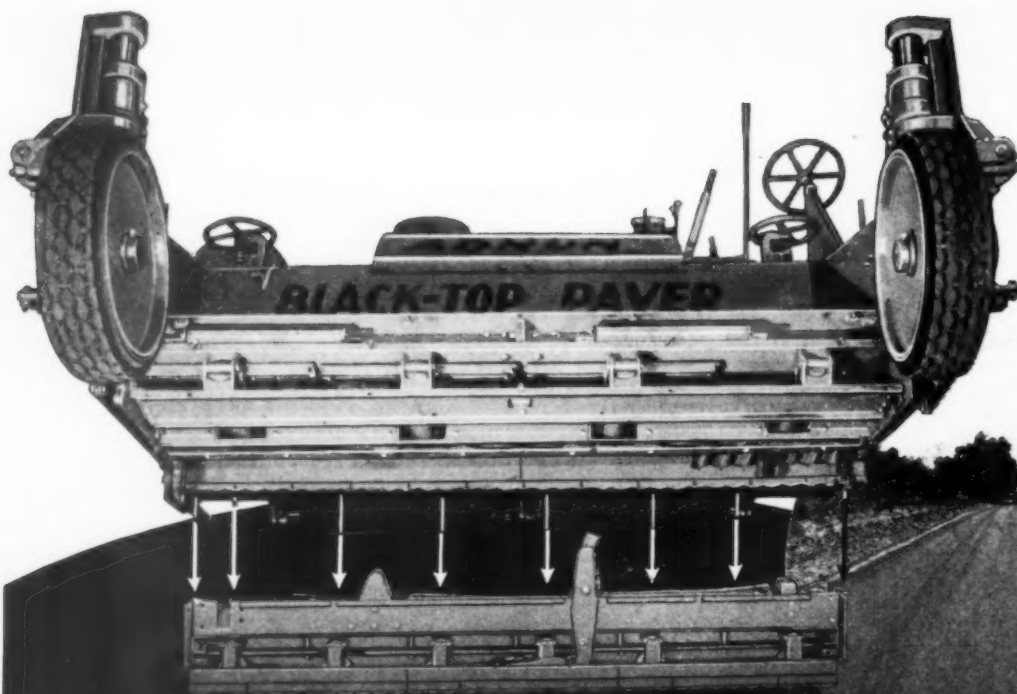
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Below Top: Here is a smooth, dense job laid by an Adnum.

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- End Gates and Cutter Bar extensions handle materials beyond ordinary widths.

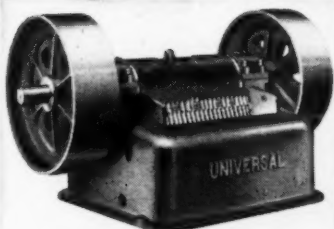


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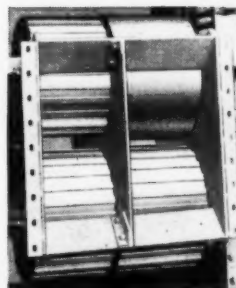
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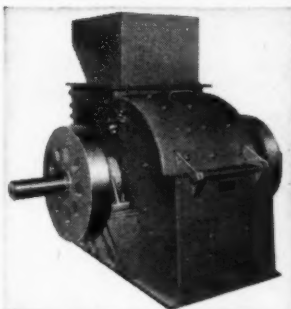
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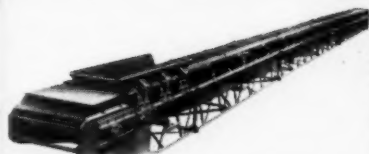
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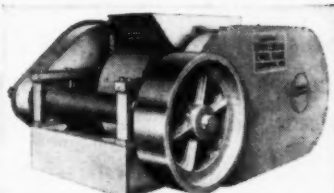
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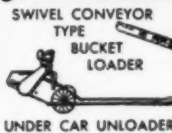
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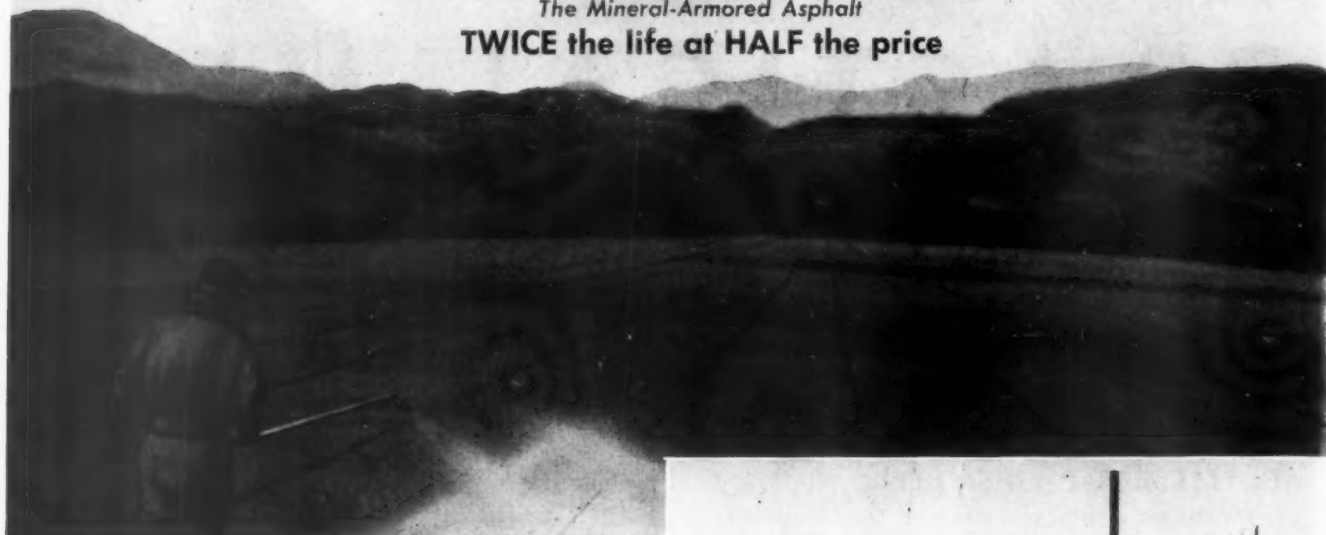
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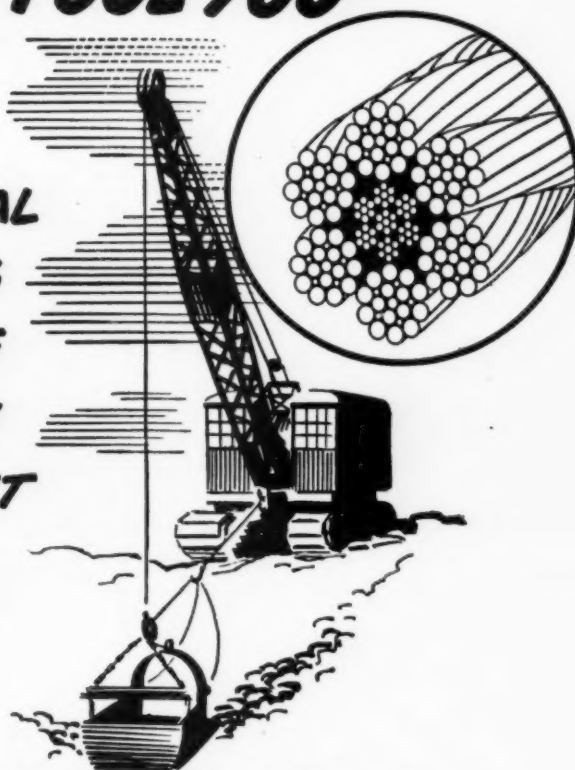


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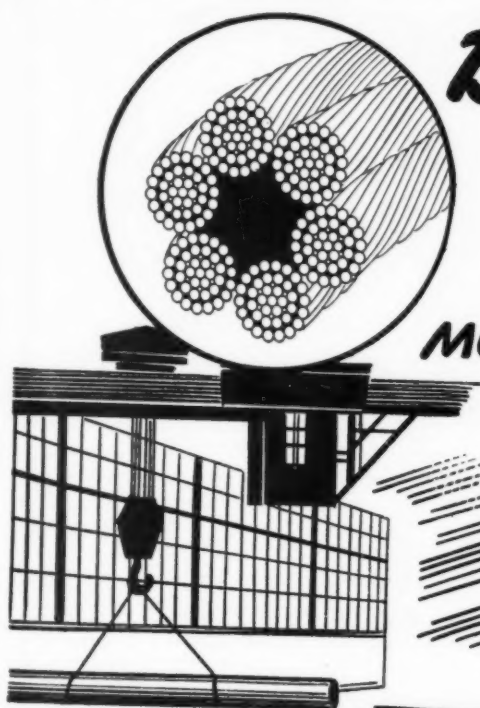


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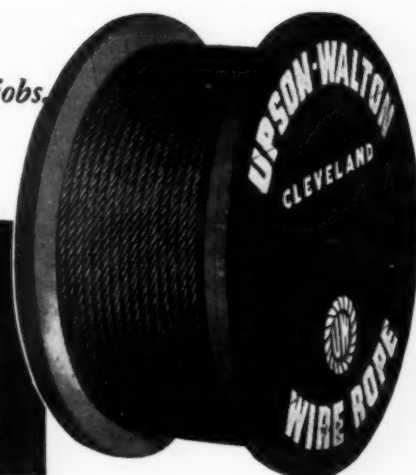
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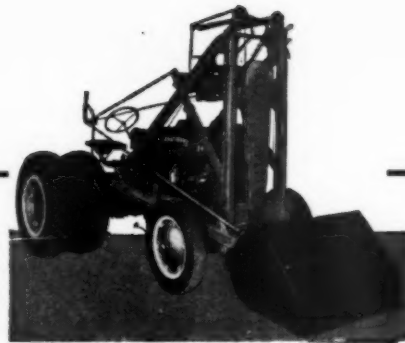
The "Spray King" has single valve control, a choice of Low Pressure or Torch Type Burners, Full Circulating Vacuum Flow or Standard Suck-Back Spray Bars up to 24 ft. in width. The bars are end-folding or can be non-folding.

Adjustable, manual operated, ground clearance controls for raising and lowering the Spray Bar. Heat Chamber for pump and valves. Filler connection at the rear of the Distributor. These are but a few of the many features of the "Spray King," the new low cost Littleford Pressure Distributor. For further information write for Bulletin Z-14H.



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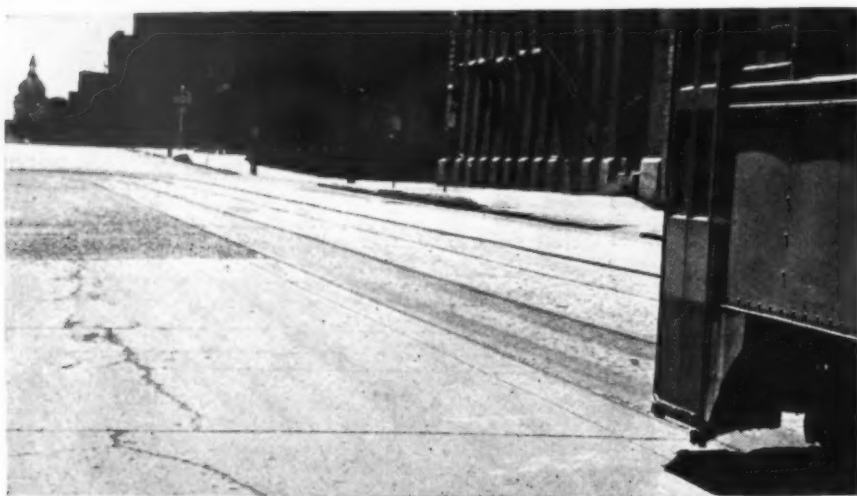
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# First Ten Years *prove:*

## Atlas Duraplastic\* Air-Entraining Portland Cement makes concrete more durable



**TEN YEARS AGO**, in August, 1939, this concrete test paving was laid in Second Avenue North, Minneapolis. The badly scaled section of roadway in the background was made with regular portland cement. The foreground section, *laid at the same time*, was made with Atlas Duraplastic—the first commercial use of the air-entraining portland cement originated and developed by Universal Atlas.

Both sections, subjected to the severity of 10 Minneapolis winters and to heavy applications of de-icing salts, are shown above as they appeared in July, 1949—convincing proof of the characteristic durability of Duraplastic concrete, of its high resistance to freezing-thawing weather and the scaling action of de-icing salts. Longitudinal structural crack shows some ravelling. Note perfect transverse joint.

**F**ROM its first small commercial use in 1939 to the super paving and construction jobs of today, the outstanding durability of concrete made with Atlas Duraplastic has won increasing recognition among engineers and contractors. Proof of its wide acceptance: In 1939, less than 60,000 barrels of Duraplastic were used for paving, then its sole use. In the following ten years, more than 25,000,000 barrels have been applied to an expanding variety of concrete uses.

**For Paving Concrete**, Duraplastic creates entrained-air cells in the concrete that minimize bleeding and segregation and thus protect it against the scaling action of freezing-thawing weather and de-icing salts (see photo). Less mixing water is required for a given slump. The resultant mix is more plastic, more cohesive, more uniform. It dumps, screeds and finishes easily.

**For Structural Concrete**, Duraplastic imparts to the mix the extra plasticity that aids proper placement.

Water gain and segregation are reduced; surface appearance is improved. Because of these advantages *and* added durability, architects, engineers and contractors today rely on Duraplastic for all types of mass and structural concrete—for foundations, walls, floors, columns and other construction. And they find it readily adaptable to slip-form work, gunite, stucco and other uses.

**For Concrete Products**, finished units of block, brick, pipe, drain-tile, silo staves, etc., exhibit greater resistance to passage and absorption of water. For machine-made products, manufacturers find Duraplastic permits a damper mix that is more cohesive, holds together better and feeds easily through machines. Plants report savings in fewer culls and throwbacks and less breakage in handling green products.

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\*"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company.

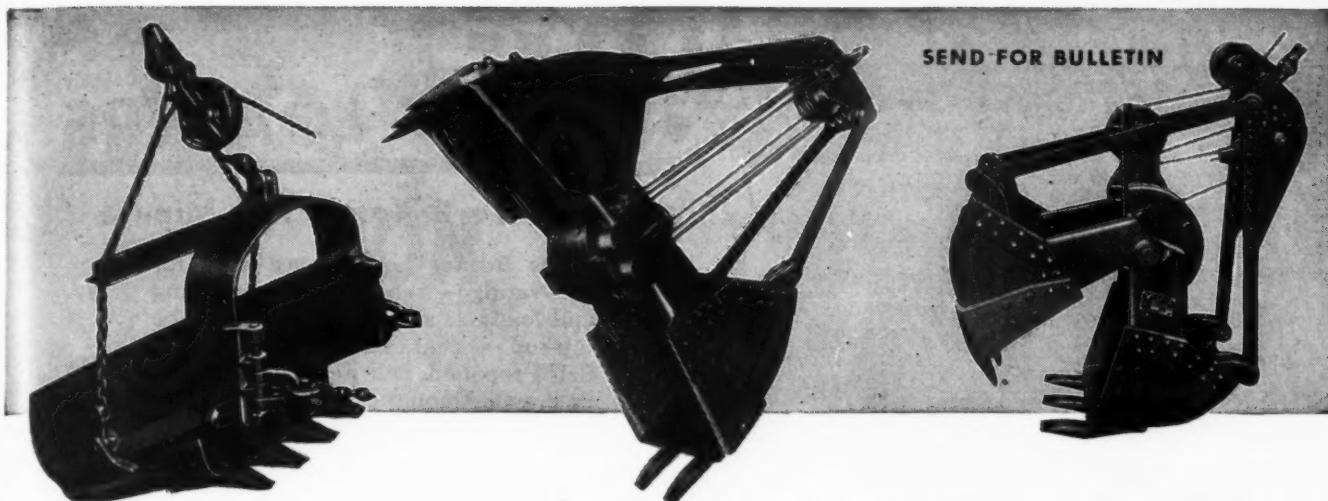
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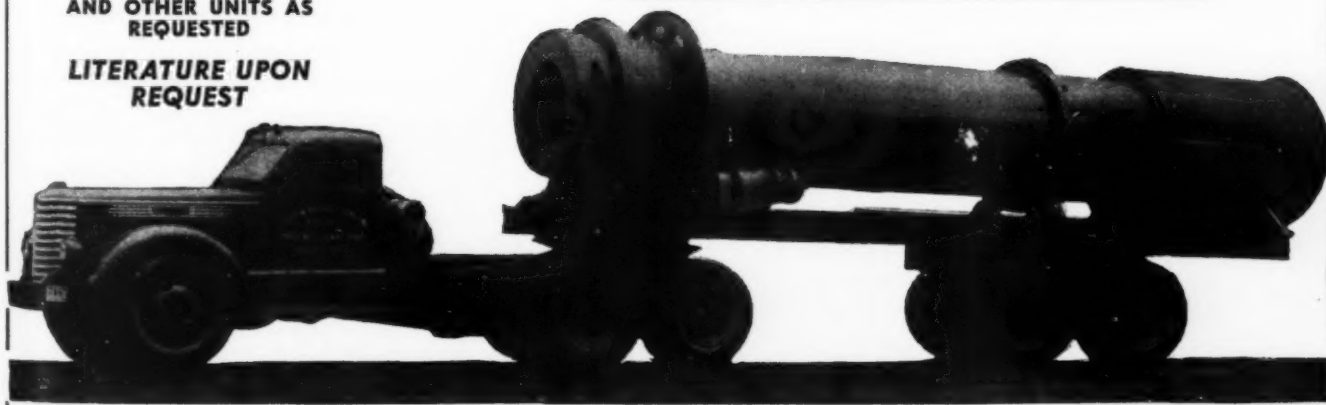
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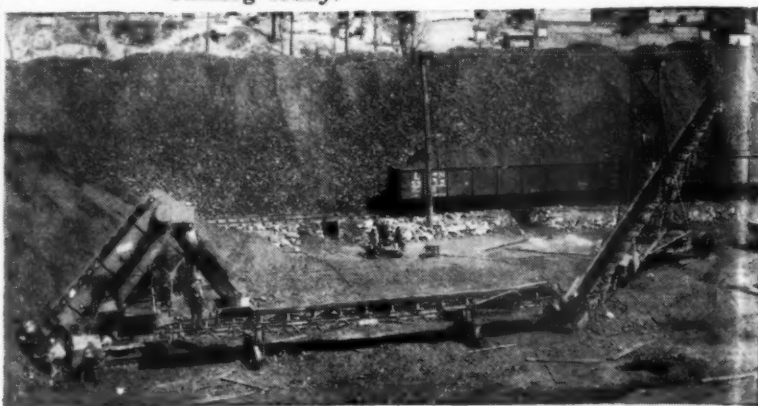
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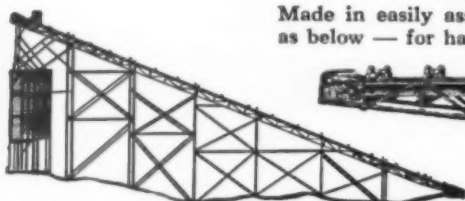
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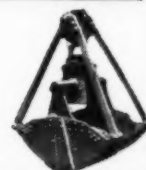
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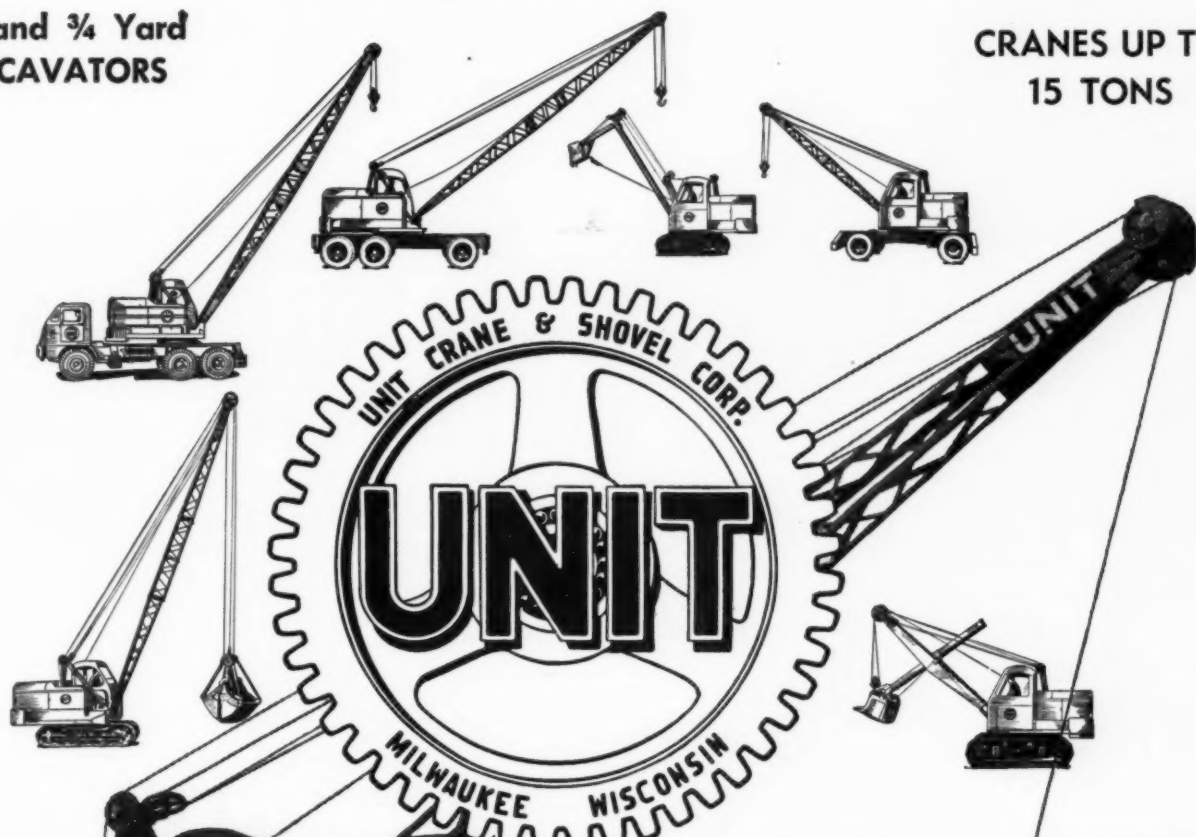


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Regardless of whether your job calls for a shovel, clamshell, magnet, dragline, trencher, grapple or backfiller, a UNIT machine easily "fills the bill"! For UNIT is convertible to ANY attachment and gives an excellent account of itself on ALL types of service. The change from one attachment to the other can easily and quickly be made on the job, by any ordinary mechanic. UNIT exclusive features include: Automatic traction brakes... Disc type clutches... One-piece cast gear case and above all, UNIT's safety-promoting FULL VISION CAB.

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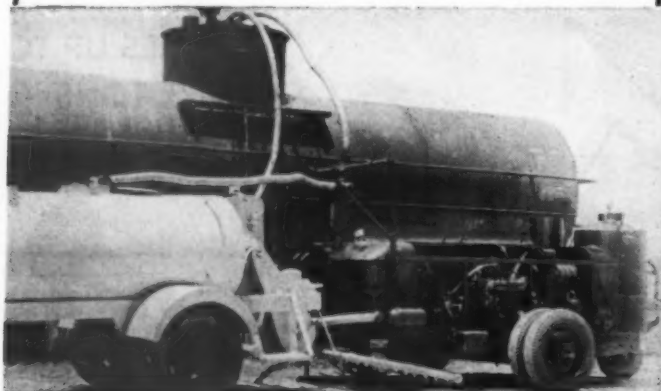
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## PACKAGED HEAT

More square feet of heating surface means longer flue life in the

**GRACE** RAPID FIRE  
Circulating & Steam heater  
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The two units are mounted on one chassis, suitable for truck mounting.  
Steamer thaws one car while circulator is heating and unloading another.

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THE  
MOST  
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WAY FOR LAYING  
BITUMINOUS  
PAYING NOW AVAILABLE



ALL BITUMINOUS MATERIALS THAT CAN BE RAKED CAN EFFICIENTLY BE APPLIED . . . with SPREADER-PAVER

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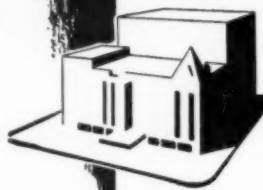
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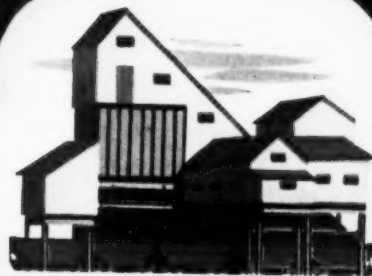
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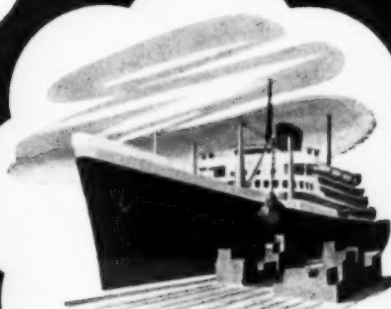
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MODEL 105

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GASOLINE ENGINE DRIVEN COMPRESSOR

- Easier, cleaner air because it is watercooled.
- Lower fuel consumption with *Pneumastat* saving up to 50%.
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- Entire unit built by SCHRAMM, therefore, one responsibility.
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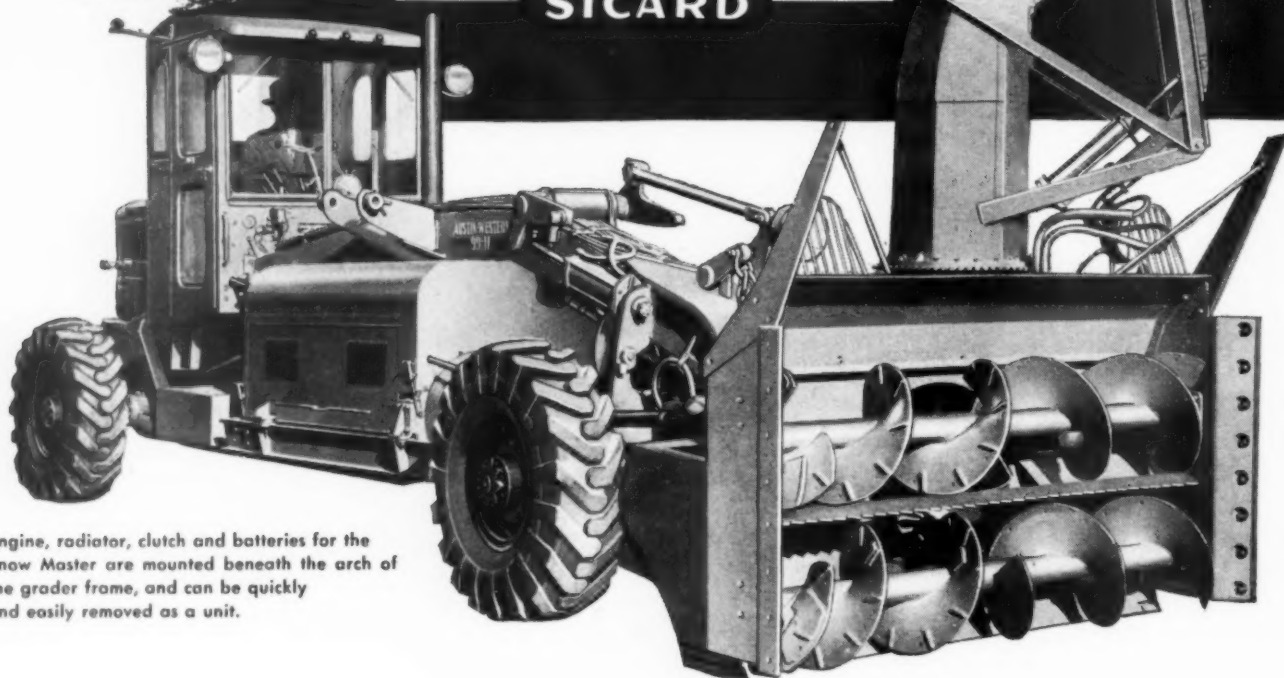
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# Break That B

*With this POWERHOUSE Combination*

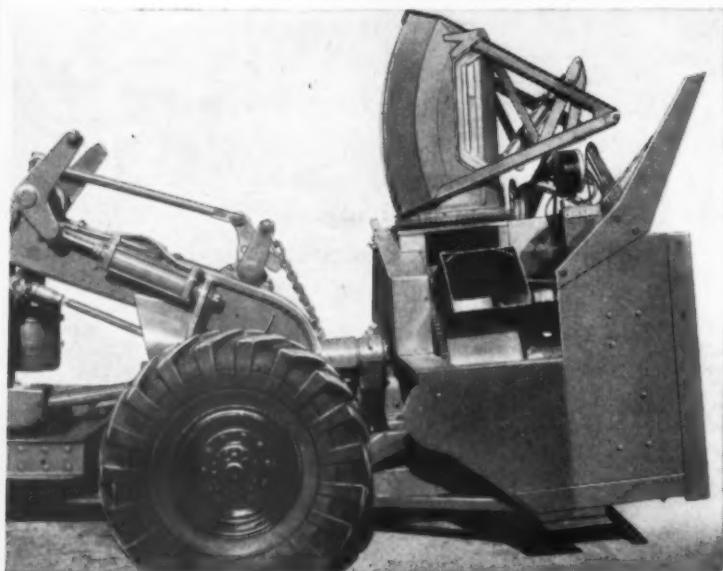
**Austin-Western**  
**SICARD**



Engine, radiator, clutch and batteries for the Snow Master are mounted beneath the arch of the grader frame, and can be quickly and easily removed as a unit.

## **AUSTIN-WESTERN**

### **All-Wheel Drive and Steer Power Grader with SICARD Snow Master Rotary Snow Plow**



Close-up of Sicard Snow Master in raised position, with blower housing revolved for casting to the right. The Sicard unit can be quickly removed from the front end of the grader.

Wherever there's a tough problem—freeing country roads from a smothering blanket of snow, loading trucks to capacity in crowded business districts, or cleaning streets right to the curb in closely built residential areas—this outfit has what it takes. Sicard Snow Master, with its powerful blower and exclusive patented "wrist action" chute for precision casting, backed by the power and drive of the Austin-Western Power Grader, with its exclusive All-Wheel Drive for maximum traction and *front end* control, and exclusive All-Wheel Steer for maximum maneuverability and *rear end* control.

This is no *single season, single purpose* unit! The grader that drives the Sicard is the same Austin-Western machine that dominates the *grader* field 365 days a year on every type of work. Thus, there is no closed season for the outfit. Spring, summer and fall it's the last word in graders ... when winter rolls around, it is ready in a few hours for the job of snow removal.

**AUSTIN-WESTERN COMPANY**

AURORA, ILLINOIS, U. S. A.

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# NO BLOCKADE!



Cutting through heavy, icy drifts in the Colorado "Rockies."



Power and steering control at all four wheels holds the grader steadily to its work in widening.

## EXCLUSIVE FEATURES Set New Performance Standards

The powerful rotary augers of the Sicard grind up compacted snow and ice, whirling it toward the throat of the blower. The exclusive, saw-tooth cutting table, separating the two sets of augers, prevents the snow cut by the upper augers from falling and choking the lower series. There's no bottleneck at the front end of the Sicard... each auger does its share of the work. Ice cutters can be quickly attached to the augers, when exceptionally difficult conditions are encountered.

The blower of the Snow Master has a casting range of up to 150 feet on either side, *plus* the exclusive, patented "wrist action" casting chute which is completely controllable.

All-Wheel Drive provides the *front end* control which has been found so important on truck-mounted rotary plows. All-Wheel Steer provides—for the first time on any rotary—the short turning radius which is always advantageous, and the *rear end* control which is the only thing that will successfully resist the side draft that is always present when widening out.

Austin-Western and Snow Master—this is the combination to break the clutch of winter—to keep city streets and country highways clear for the rolling wheels of commerce.



Complete directional control, with "wrist action" chute, makes it easy to load trucks from any angle.

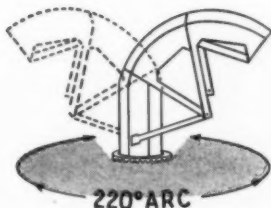


The rotatable, telescopic chute puts the snow precisely where it's wanted. No broken windows... no clogged driveways.

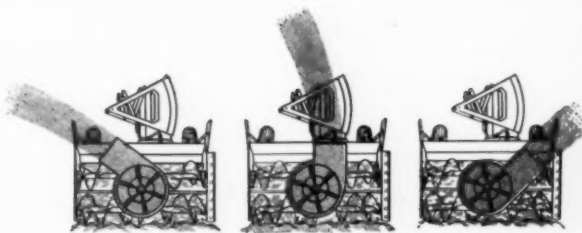
## EFFORTLESS HYDRAULIC POWER MAKES ALL ADJUSTMENTS... INSTANTLY



Controls telescopic chute for long or short range casting.



Rotates chute in 220° arc for casting or loading to either side.



Rotates blower housing for direct casting to either side, or through chute.



Austin-Western

# BE READY FOR THE WORST WEATHER



with the **best**



## CHOOSE THE SNOW PLOW TO FIT THE JOB FROM THIS COMPLETE LINE

### A-C MOTOR GRADERS with Baker "V" Plows

MODEL	BRAKE HP.	ENGINE
AD-4	104	2-Cycle Diesel
AD-3	78	2-Cycle Diesel
BD-3	78	2-Cycle Diesel
BD-2	50.5	2-Cycle Diesel
D	34.7	Gasoline
W-Speed Patrol	31.5	Gasoline

(Wings available for AD and BD models . . . scarifiers for all models, except W-Speed Patrol, for removing ice. Blade plow also built for W-Speed Patrol . . . and snow bucket for Model D.)

### A-C CRAWLER TRACTORS with Baker "V" Plows and Wings

MODEL	DRAWBAR HP.	ENGINE
HD-10	86.63	2-Cycle Diesel
HD-7	60.10	2-Cycle Diesel
HD-5B	40.26	2-Cycle Diesel

(Also: Tracto-Shovel "V" plow and Snow Loader Bucket for HD-5G)

### A-C WHEEL TRACTOR with Baker "V" or Blade Plow

MODEL	DRAWBAR HP.	ENGINE
IB	13.5	Gasoline

## FOR OPENING HIGHWAYS . . .

. . . it's heavy-duty, diesel-powered Allis-Chalmers Motor Graders and Crawler Tractors with Baker snow plows. A right size to fit your conditions—but not one-job machines. Each model handles light or heavy plowing efficiently and economically. Provide instant starting and operation on diesel fuel! Exclusive tubular frame on A-C Motor Graders absorbs the shocks and strains that come from bucking heavy drifts. Tandem chain drive and proper weight distribution gives you the traction to keep moving through toughest going.

Also available—Baker snow plow for the new, low-cost Allis-Chalmers Model D Motor Grader with exclusive tandem drive. Gasoline powered, for light to average work . . . a money-saver on many jobs.

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# equipment

*You can depend  
on AC's to handle  
toughest snow removal  
at lowest cost—  
all through the winter*

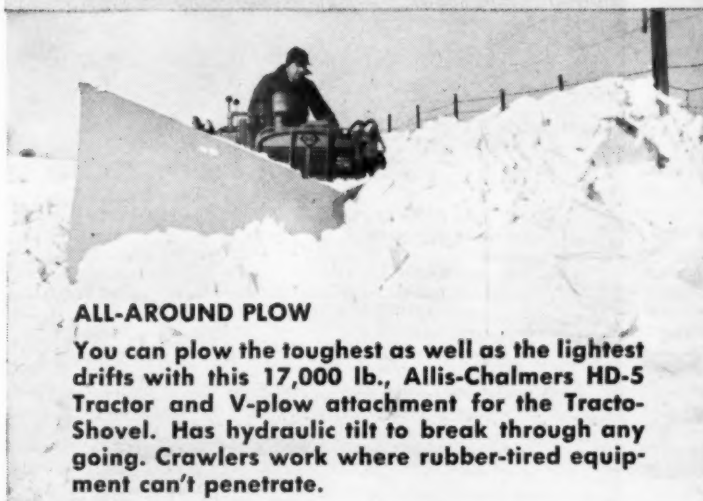
## FOR CLEARING WALKS, DRIVEWAYS, PARKING AREAS...

... it's the Allis-Chalmers Model IB Industrial Wheel Tractor with broom or snow plow—"V" or blade type. Has mounting frame for quickly attaching or removing auxiliary equipment. Compact, fast, low center of gravity, short-turning radius, gasoline powered. Handles all kinds of jobs all year, at big savings.



## FOR LOADING OR PLOWING SNOW...

... it's the Allis-Chalmers HD-5 2-Cycle Diesel Tractor with a Tracto-Shovel light materials bucket or V-plow—both are interchangeable. Ideal for cleaning up streets, alleys, gasoline stations, parking lots . . . working around buildings, industrial plants, cemeteries, many other places. This same outfit, with other interchangeable attachments—dirt and rock buckets, bulldozer blades—handles all types of excavating and leveling . . . earns an income for contractors the year around . . . stretches city and highway budgets.



## ALL-AROUND PLOW

You can plow the toughest as well as the lightest drifts with this 17,000 lb., Allis-Chalmers HD-5 Tractor and V-plow attachment for the Tracto-Shovel. Has hydraulic tilt to break through any going. Crawlers work where rubber-tired equipment can't penetrate.

# ALLIS-CHALMERS

TRACTOR DIVISION

MILWAUKEE 1, U. S. A.



# You're Right With FORD POWER!

# 3

1. FORD POWER is the power you can count on for your industrial engine needs.
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Ford 120 Four Cylinder  
Industrial Engine Power Unit  
(120 cu. in. displacement)



For power, pick Ford! There's a model just right for your application. In the great Ford Industrial Engine "Power-Family"—a "Four" with 120 cu. in. displacement... two "sixes"—226 cu. in. and 258 cu. in. displacement... two "V-eights"—

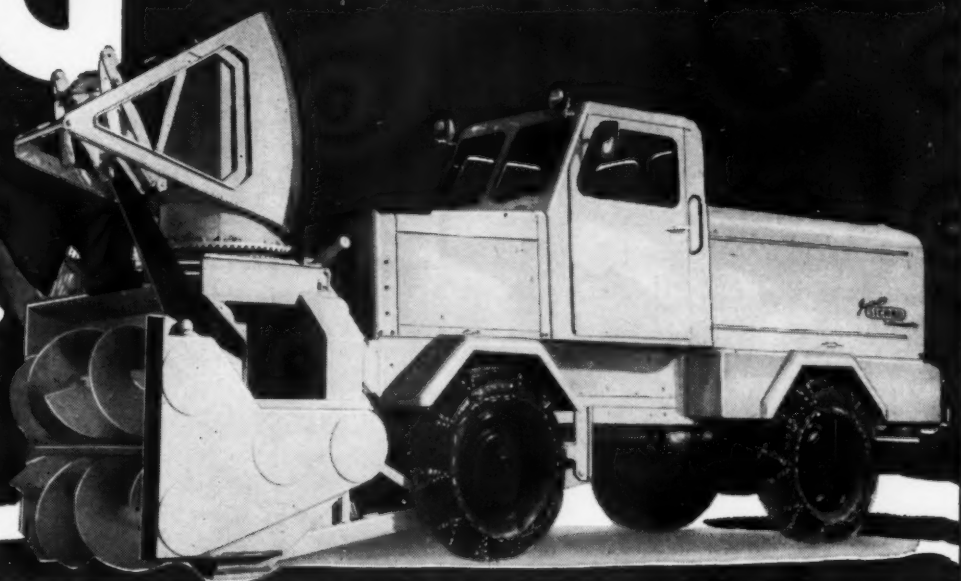
230 cu. in. and 360 cu. in. Each one completely new, the right power for you—for farm implements, construction, body work, material handling, pumping, many other important uses. Write today for complete specifications.

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**FORD MOTOR COMPANY**  
Dearborn, Michigan

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED

# BIG PERFORMANCE

*at Low Cost!*



**SICARD**

## SNOW MASTER JUNIOR

... AS AUXILIARY EQUIPMENT ... FOR LIMITED BUDGETS  
... FOR SMALLER COMMUNITIES ...

Efficient, economical snow clearance now is within the reach of even small budgets with the Snow Master *Junior*, a product of Sicard research and engineering. Husky, powerful and versatile, the *Junior* answers the demands of a host of new users who want a low-cost machine able to stand the gaff all winter long. It has proved itself the ideal machine for many cities, towns, smaller communities and large industrial plants. The *Junior* also is in demand as auxiliary equipment to the larger Snow Master in the biggest cities and on airports and airdromes.

The *Junior's* 100-inch wheelbase makes it highly manoeuvrable, and its sturdy four-wheel-drive gives it positive traction in the heaviest snow and slush. This versatile machine has all the job-proven Sicard features: twin augers with unique equalizer bar, long-range reversible casting turbine to propel snow far from cleared areas, and the patented Sicard "Wrist-Action" Chute for pack-loading moving trucks or spot-casting snow to vacant lots, lawns or fields. The *Junior* is equally at home in narrow laneways, around buildings, on hangar aprons and in busy downtown traffic areas. It gives big-machine performance at small-machine cost.

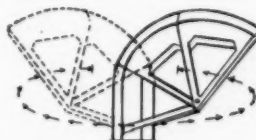
*For name of your nearest distributor, write to Sicard Industries Inc., manufacturers of the Snow Master Junior, the Snow Master, the Sanivan and the Master Flusher.*



**DRIVER COMFORT.** Finger-touch hydraulic controls located in heated cab for comfort and efficiency.



**FOUR-WHEEL DRIVE.** Sure-traction transmission gives power to spare. The *Junior* goes through where others stall.



**FAST, SURE LOADING.** Exclusive, patented "Wrist-Action" Chute swings on a 220° arc, provides unmatched versatility.

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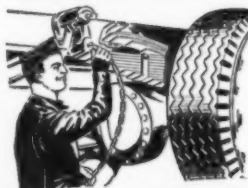
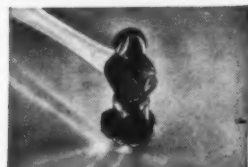
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## maintenance costs



**HIT IT!** Marfak won't splatter like ordinary grease — proof that heavy loads and rough roads won't hammer it out of spring shackles, tie rods and other chassis parts . . . that Marfak gives safer, longer-lasting protection with fewer applications.



**TEXACO  
MARFAK**  
assures  
longer life  
for all  
chassis  
parts

*Texaco Marfak* is the longer-lasting chassis lubricant that *stays on the job*. Heavy loads and rough service won't squeeze or jar it out of bearings. *Texaco Marfak* seals against abrasive dirt, keeps rust-forming moisture off metal. Parts last longer, maintenance costs less.

In wheel bearings, use *Texaco Marfak Heavy Duty*. It provides fluid lubrication inside the bearing, but retains its original consistency at the edges . . . sealing itself in, sealing out dirt and moisture. Protects against rust, too. No

seasonal change is required.

For crawler track mechanisms, use *Texaco Track Roll Lubricant*. It assures longer life for all parts, and lower maintenance costs.

Let a Texaco Lubrication Engineer explain the Texaco Simplified Lubrication Plan, and show you how it can reduce costs all around. Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

**MORE THAN 300 MILLION POUNDS OF MARFAK HAVE BEEN SOLD!**



# TEXACO Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT



## Biggest Reservoir Clearing Project

**New "Logger's Dream" units aiding tractors, rakes, chain saws and mules in clearing 100-square-mile Wolf Creek Reservoir in Southern Kentucky**

**By W. C. Treadwell**

Superintendent, Schutt Construction Co. & Associates, Somerset, Kentucky

**T**HE Wolf Creek Reservoir Project on the Cumberland River lies in southeastern Kentucky. The dam site is in Russell County, 10 miles southwest of Jamestown, Kentucky, some 461 miles above the river's junction with the Ohio River.

Wolf Creek Dam is a multi-purpose project primarily for flood control but also of material value for hydro-electric power production, navigation improvement, pollution abatement and for recreation. The Dam has an overall length of 5,736 ft. and will require 1,400,000 cu. yd. of concrete and 9,500,000 cu. yd. of earth to attain the full height of 258 ft. At the maximum pool elevation of 760, the reservoir will have an area of 63,500 acres, impound 6,089,000 acre-feet, and back water some 100 miles up the Cumberland River Valley to create the world's fourth largest man-made lake.

### Many Deep Valleys

While much of the lower Cumberland River basin is rather flat, the basin above the dam is quite rugged, with the main stem and tributary streams cut into deep, narrow valleys. On the reservoir rim small ravines have cut deeply into the basin walls to create a network of deep finger valleys and ridges which in places are only a few hundred feet wide at maximum pool level. The bottom lands in the reservoir area are largely in cultivation, while the hills are used for grazing and timber production. Approximately 50% of the area is timber covered, principally second growth. At elevation 760, the length of shore line will be 1,200 miles. Railroad and highway relocations will require construction of one main railroad bridge and eight highway bridges.

A major portion of Burnside, Ky. (pop. 880), will be moved to higher levels. About 3000 graves will have to be lifted. Clearing operations are underway on all areas below elev. 723, totaling about 46,000 acres.

In May, 1948, Herman H. West and Company, Inc., was awarded a clearing contract for the first portion, 10,768 acres, extending from the dam site to a point 18 miles upstream; lump sum of \$688,000. In January, 1949, Schutt Construction Co. & Associates were successful bidders on Group 2, or 30,512 acres, immediately above Group No. 1 and terminating at Burnside, Kentucky, some 52 river miles above the dam; lump sum \$3,989,000. Additional contracts have also been entered into with the Volunteer Clearing Company for clearing 5,859 acres (\$1,929,370) and with Schutt Construction Company for 1675 acres (\$589,000). Total: 48,806 acres, \$7,195,000.

The Schutt contract work began March 10 and was stipulated to be completed in 320 calendar days. As of July 25 the work was 65% completed, or 2 months ahead of schedule. Our largest monthly estimate up to then was \$419,106 not including 10% retainage, with 3611 acres completed. The Schutt organization's experience in clearing, covering numerous big reservoirs and river areas, thus is paying off.

### Clearing Methods Outlined

In the early stages of clearing operations on this project both the prime contractors and their sub-contractors arrived at a typical organization for their crews. Experience to date shows that efficient clearing operations will result when the crews are set up as outlined below:

Each operation in the area is covered by a unit or spread of about 150 men under a supervisor.

The spread is sub-divided into 20-man crews under foremen.

**Equipment** The principal pieces of equipment assigned to each spread:

Four small winch tractors—similar to A.C. No. 5.

One large winch tractor—similar to D8 Caterpillar.

One large tractor with winch and dozer blade.

One medium size tractor (say A.C. No. 7) with double drum for rehaul. ("Logger's Dream" unit, pictured is a substitute for the rehaul job).

Six teams, five power chain saws.

Two medium size trucks, one pickup, one ambulance, 2 jeeps.

One compressor and welding rig.

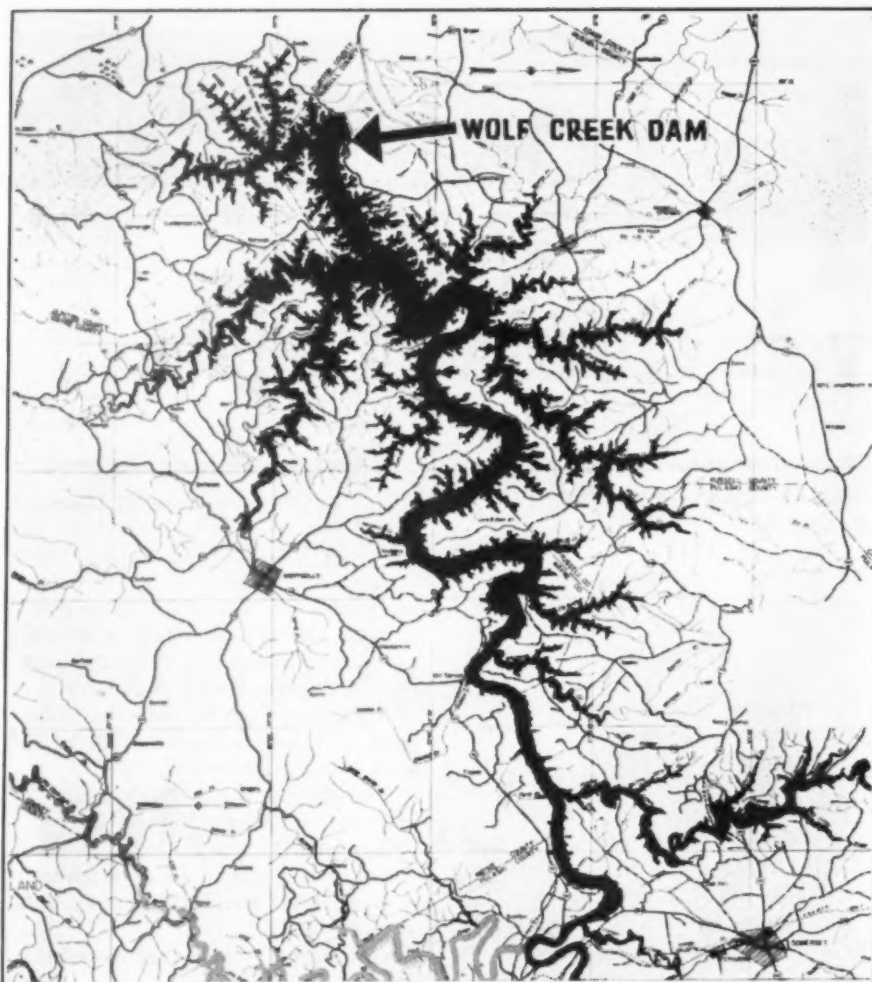
Non-mobile equipment other than compressor and tool boxes are a hindrance to field crews.

Two general methods of clearing have been developed to suit the topography in the reservoir: Regular clearing on the flat or sloping terrain readily negotiated by men and equipment; and bank or bluff clearing.

In regular clearing the distribution of the 150-man unit is as follows:

★ "Logger's Dream" unit drawing timber across stream





★ Outline of Wolf Creek reservoir, which sets something of a record in shore line irregularity as well as clearing expense

contractors who operate mills in the general vicinity.

(c) Winching (preparatory to piling)

4 small tractors and 16 men  
2 large tractors and 6 men  
1 rehaul (or "Logger's Dream") 4 men  
Foreman—1  
Total men—27 or so.

Six mule teams, and six drivers. (These men are assigned as needed, depending on the topography).

(d) Hand Piling

50 men and foreman (will usually have one or two teams)

(e) Burning

20 men and foreman.

Ordinarily this crew will have a team. During the peak of the burning operation a dozer with blade and only 2 men are used.

To round out the 150-man spread, water boys, mechanics, saw filers, first aider and supervisors are added as required. When all sections function properly no backtracking for final clean up is necessary.

Bank clearing and bluff work is by far the most difficult and hazardous operation of the clearing work. Much the same method as outlined above is employed on bank and bluff work. After the felling operation the trees that fall into the river are winched out to high ground, decked, and burned. In this phase of the work two 10-man boats with outboards are standard equipment in each 150-man spread. By this means men are transported across the river and streams; and much of the hooking on for winching and river-bank cutting is accomplished.

Bluff work with its extremely difficult felling and piling operation is without a doubt the number-one headache. Next in order of difficulty are:

(a) Narrow hollows, where piling is difficult due to lack of operating space.

(b) Water's edge operations.

(c) Fire control, in areas mentioned in (b).

(d) Control of upper limit clearing line. Should be a simple task, but seems difficult to all contractors.

★ HD-19 Allis Chalmers bulldozer with rake, decking

(a) One man, upper limit trimmer, uses hand level and brush hook.

(b) Felling crew: a minimum includes 20 men:

3 men with brush hooks  
3 men with axes  
4 men with 2 large chain saws  
3 men with 2 small chain saws  
4 men with 2 cross cut saws  
2 men with axes notching for chain saws  
1 foreman

This crew is presently at 50 men.

Needless to say in the interest of efficiency and safety, the sections of the felling crew are spaced so that there is no interference. All merchantable timber is cut in this operation and later snaked out by sub-

44

★ D-6 Caterpillar bulldozer stoking fire

★ "Logger's Dream" unit, devised for this project, winching logs down hillside



★ Allis off hills

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★ Allis-Chalmers HD-7 tractor with two-way winch hauling logs off hillside. Note use of snatch blocks



★ Two-man power chain saws were important here

- (e) Access to and from work areas during wet season.
- (f) Burning piles after rains.
- (g) Labor turnover.

Strict control of all fires is necessary to prevent unsightly patches of dead or charred trees along the pools' upper contour. In addition to marring the reservoir's natural shoreline beauty, uncontrolled fires could cause considerable damage to private property outside the limits of the Government's taking line. In order to keep fires to an absolute minimum the following precautions have been followed on this project:

- (a) Keep all piles as far as possible from the woods.
- (b) On known hazardous areas prepare fire lanes and burn leaves down hill before burning piles—night burning is also safest.
- (c) Avoid burning on windy days.
- (d) Have burning plans made prior to striking match.
- (e) Constant fire watch with proper fire fighting equipment.

Schutt Construction Co. & Associates consists of Schutt Const. Co. of Genoa, Wisc.; Herman H. West, Inc., of Andrews, N. C.; and Robert E. Lee Co., Manning, S. C.



★ Supervisors: Charles Schutt, project manager; Herman H. West, assistant project manager; A. N. Edwards, purchasing agent; Robert W. Elliott, office manager; Floyd L. Evans, Corps of Engineers inspector

## Clearing Methods Used at Allatoona Reservoir

*Thirty tractors and batteries of chain saws used on 10,854-acre project where Coastal, Inc., and associated contractors are clearing 800 to 1000 acres or more per month this summer*

**C**LEARING of seventeen square miles of valleys and inlets behind Allatoona Dam in northern Georgia is progressing on schedule under a \$1,228,400 contract with Coastal, Inc., of Panama City, Fla. This task—similar in many respects to the clearing for Wolf Creek Dam in Kentucky [see "Biggest Reservoir Clearing Project"]—is part of the clean-up phase of a large power development, flood control and recreational project under construction by the Corps of Engineers. The 190-ft.-high concrete dam, containing some 500,000 cu. yd. of concrete, is largely completed and the impounding of water of Etowah River will begin soon.

The lower 32 ft. of the reservoir

area (elev. 698 to 730) comprising about 80 acres was cleared in 1948 under a separate contract. The present Coastal, Inc., contract covering about 10,850 acres of clearing extending to elev. 840, or 5 ft. above the spillway crest. The area was advertised in six parcels, this firm being awarded the entire job in September, 1948, on a low combined bid.

Two classes of clearing, "heavy" and "relatively clear or once cultivated," representing about 6550 and 4300 acres, respectively, were described in the specifications. The terrain behind the dam includes typical mountain valley land. The many steep, rocky cliffs and swales made it impracticable to use portable disc saws. The timber consists mostly of pine with some hardwoods in a stand once quite heavy but recently thinned by land owners selling the best logs

★ A good idea for any tractor owner: this tractor is having its tracks blown clean with small portable compressor (Schramm). Allatoona project







★ Steep going in a narrow draw. International Tractor is dragging timber out of an inaccessible spot preparatory to decking

in anticipation of government purchase of the land.

Specifications require removal of all timber and fencing and "every growing thing" except grass and weeds. No debris can be left on the government reservation. No trees are allowed to fall into streams except under winch control to insure immediate removal. Other provisions:

#### Much "Low Stumping"

Trees or brush less than 4 in. in diameter are to be cut off flush with the ground; trees up to 24 in. diameter, 1 ft. above the ground; trees over 24 in., 2 ft. above the ground; all measurements on uphill side of the stump.

Old stumps are to be cut when necessary under these provisions.

"Low stumping" or cutting of all stumps flush is required over numerous specified areas designated as pos-

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sible boat landings or swimming and mosquito control area. (Mosquitoes would breed on larvae harbored in rotting stumps which might otherwise be exposed over shallow areas during fluctuations in the reservoir level.)

The clearing crews began at the dam and worked upstream, taking selected areas on both sides of the main valley and tributaries. The contractor is required to work from the lower contours upward, clearing everything to the 800 ft. contour line before engaging in any clearing above that line, so that storage can begin as soon as possible. All areas must be cleaned up as work progresses. Exceptions to this procedure are permitted on steep slopes, isolated areas or in small draws, where the contractor can with permission clear to full height in order to save having to come back later at considerable expense.

The engineers are required to provide clearly visible contour marking. All timber is the property of the contractor (actually nearly everything has been burned).

No grubbing is done, since uprooting may bring up considerable clay making burning virtually impossible.

#### Three Crews Working

As of early summer, the job was 35% completed and three outfits of approximately 75, 30 and 150 men, respectively, were at work. Serving the 255 men were some 30 diesel tractors comprising D8 and D7 Caterpillars, HD7 and HD19 Allis-Chalmers, and

TD9 and TD18 Internationals. The smaller tractors were employed on lighter work. Tractors were variously equipped with Isaacson or Fleco rakes or forks, mounted on hydraulic or cable operated dozer frames. Of course, winches were in constant use.

In a typical operation three crews work out as follows:

(1) Felling; brush cutting done by "swampers" with hand brush axes, followed by gasoline-powered chain saws for trees. Saws in use include models by Mail, Disston, Polard and McCulloch. Some cross-cut hand saws have been employed in areas too rugged for handling of power chain saws. In a few places axemen have had to be lowered by ropes, but these spots are the exception.

(2) Decking crew, working several hundred feet back for safety. In this operation tractors doze the brush into piles some 100 ft. apart for burning. Winch lines from the power take-off or dead lines from the tractor are used to draw the piles tight, and to snag felled trees out of swampy or inaccessible areas or up banks.

(3) Burning crew following within a few days. Burning sometimes requires two stages, but the sap-laden trees have burned with little trouble other than dozing the fire remnants into new piles for the final burning.

#### Worker Safety Watched

Thus far not a single serious accident has marred this project, thanks to constant safety campaigning. Each of the several crews works from a constantly changing field base at which is stationed a compressor for air cleaning of tractor tracks, a field repair and tool truck, and incidentally complete first-aid equipment. Several miles of "jeep trail" have been opened up to gain access to the various reaches of the project.

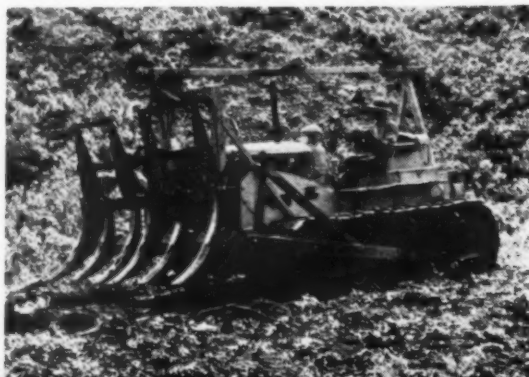
Clearing has averaged 20 to 30 acres per day of 9 hours this season. Clearing is under the direction of two clearing inspectors, reporting to the resident engineer.

Allatoona Dam and Reservoir is a Corps of Engineers project, under the Mobile, Ala., District Engineer.

#### Average State Gas Tax 4.35 ct.—

The average gasoline tax in all states was 4.35 ct. in 1948, according to the Public Roads Administration. The average tax in 1947 was 4.25 ct. State gasoline taxes in 1948 ranged from 2 ct. in Missouri to 9 cts. per gallon in Louisiana.

★ Giving an idea of the rough country involved in the clearing project. Three types of rakes employed. (Fleco; Isaacson)



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# Another Joint Committee

*Contractors and Equipment Manufacturers Form Important New Liaison*

A JOINT cooperative committee of the Construction Industries association and the Associated General Contractors of America, Inc., has been formed, according to word from AGC. The CIA is made up of manufacturers of construction equipment, supplies and materials. The AGC is composed of 5,000 leading general contractors.

The announcement, following meetings of exploratory committees of the two organizations, was made jointly by AGC president Adolph Teichert, Jr., president of A. Teichert & Son, Inc., Sacramento, Calif., and CIA president Ralph K. Stiles, executive vice president of the Austin-Western Co., Aurora, Ill.

General purpose of the committee will be to provide a medium through which manufacturers and general contractors can cooperate to increase efficiency in the construction industry.

The Cooperative work by members of the CIA-AGC Joint Cooperative Committee will concern itself with problems in the construction equipment field, such as the presentation and utilization of ideas of general contractors concerning desirable new types of equipment; improvements of present equipment, and gradual progress toward more completeness and uniformity in repair parts catalogs.

First meeting of the committee will be held in Chicago September 15, immediately following the midyear meeting of the AGC Governing and Advisory Boards which will be held September 12-14 at French Lick, Ind.

The CIA, which on July 1 established its headquarters at 1212 Field Building, Chicago, Ill., is composed of approximately 300 manufacturers of equipment, supplies, components and materials. Harold F. Hess is executive secretary of the association.

The AGC, of which H. E. Foreman is managing director, is composed of more than 5,250 general contractors performing all types of construction work throughout the country.

Members of the new joint committee were announced as follows:

## Representing CIA

**W. B. Greene**, (co-chairman), president, Barber-Greene Co., Aurora, Illinois.

**Everett F. Armington**, vice president in charge of sales, Euclid Road Machinery Co., Cleveland, Ohio.

**J. T. Callaway**, assistant to the vice president, The Goodyear Tire &

Rubber Co., Inc., Chicago, Ill.

**Carlton R. Dodge**, vice president, Northwest Engineering Co., Chicago, Ill.

**Kenneth Lindsay**, vice president, Iowa Manufacturing Co., Cedar Rapids, Ia.

**H. R. Meeker**, president, The J. D. Adams Co., Indianapolis, Ind.

**H. T. Reishus**, general manager, Industrial Power Division, International Harvester Co., Chicago, Ill.

**Julian R. Steelman**, vice president, Koehring Co., Milwaukee, Wis.

**Harold F. Hess**, (co-secretary), executive secretary of the CIA.

## Representing AGC

**George C. Koss** (co-chairman), Koss Construction Co., Des Moines, Ia.

**Carl E. Nelson**, of the firm by the same name, Logan, Utah.

**Leet M. Denton**, Denton Construction Co., Detroit, Mich.

**D. W. Winkelman**, D. W. Winkelman Co., Syracuse, New York.

**Lyman D. Wilbur**, Morrison-Knudsen Co., Inc., Boise, Idaho.

**John MacLeod**, Macco Corp., Paramount, Cal.

**A. L. Atherton**, Atherton Construction Co., Seattle, Wash.

**F. L. Shackelford**, Potter-Shackelford Construction Co., Greenville, S.C.

**C. S. Embrey**, (co-secretary), National AGC staff, Washington, D. C.

The CIA-AGC Joint Cooperative Committee is the sixth such group to be established between the AGC and other associations and professional societies of the construction industry to promote mutual understanding and cooperative work in fields of common interest, for the benefits of the industry and the public.

Other committees are maintained with the American Association of State Highway Officials, The American Institute of Architects, American Society of Civil Engineers, Associated Equipment Distributors, and the National Association of State Aviation Officials.

## Timely Suggestions for Storing Rock Salt

Many commissioners who rely on rock salt during the winter for fast and economical snow and ice removal have developed low cost storage facilities in their communities, using a wide variety of storage methods to meet individual local requirements, according to a study of the problem made by the International Salt Company, Inc.

Unused buildings or parts of buildings, open sheds, and storage out of doors in the weather have all been used satisfactorily to store rock salt in bulk or in bags, the study revealed. The commissioner in one town solved his problem by borrowing silos owned by a local chemical company and unused during the early fall and winter months when he needed them; other men have made similar arrangements with owners of buildings in their localities.

In recent years a growing number of commissioners have stored large quantities of rock salt in the fall as a reserve supply and used it as insurance against a hard winter and the interruptions in deliveries that occur when major storms hit a wide area. In such a situation rail transportation is often slowed down at the time when demand for rock salt is greatest, and causes delays in delivery. Under these circumstances the only way that commissioners can provide snow-free streets with rock salt is by having adequate stocks on hand at a convenient location for immediate use.

In selecting storage locations commissioners look for unused buildings and sheds, or portions of them. When these are not available, however, rock salt, either in bulk or in bags, may be stacked against a garage or shed wall, put in open bins, or stored completely in the open, either on the ground or, preferably, on a raised platform. When it is placed in the open in this way, rock salt is generally covered with a tarpaulin.

## 40-Ton Platform

A platform 30 feet square will hold approximately a 40-ton minimum carload of bulk rock salt in a conical pile. Generally the platform is no more than a few inches off the ground to facilitate loading and unloading. No special equipment is needed for this; conveyor belts and shovels do the job satisfactorily.

If rock salt is stored in bags, the storage platform may be close to the ground, although some commissioners prefer to have it at truck level so that the bags can be more easily lifted off and on the truck beds. Fifty tons of rock salt can be placed on a low platform 30 feet wide, with the bags 4 or 5 layers deep. When the platform is high, it is generally not loaded with more than 40 tons of salt.

**State Gas Collections Increase**—State Motor-fuel tax collections and other receipts, such as inspection fees, dealers' license fees, fines and penalties, amounted to \$1,350,028,000 in 1948, as compared with a total of \$1,206,305,000 in 1947.



# Kansas Engineers to Study

## Coarse Ground Cement and Puzzolanic Additions

Two concrete test roads are under construction this year in a program to investigate long-range durability factors

By W. J. Arndt

Assistant Engineer of Materials  
State Highway Commission of Kansas

THE 1949 Kansas Legislature provided the State Highway Commission of Kansas with current funds to make a good beginning toward the fulfillment of a long range 20-year road building program. Kansas has had a doubtful reputation for its road system, not only with people of Kansas, but also with tourists who had occasion to go through Kansas.

The state highway system has not particularly lacked in engineering care but more in adequate funds to meet growing pains. The State Highway Commission was not created until 1929. By that time the demand for a modern system was very high. Constitutionally the State was placed on a pay-as-you-go basis, and with 9,000 miles to modernize, with revenue ranking Kansas 47th, it is obvious why the system was paper-thin and therefore inadequate. Worse, the halting of construction and the meagerness of maintenance during the war brought Kansas to the edge of road disaster in postwar years period.

Under the leadership of Governor Frank Carlson, who sensed the popular demand for a good road system, the 1949 Legislature adopted most of the main points made in a comprehensive engineering report by a 22-48

★ Paving in progress on the Koss Construction Co. job on the project south of Topeka, Kansas, on U.S. 75. Note that two 34E Koehring pavers are being used outside of the forms, followed by a Jaeger concrete spreader, a Jaeger finishing machine, a Heltzel Flexplane, a Koehring mechanical bull float, and a mechanical belting machine

man committee appointed at the direction of the 1947 State Legislature. This Committee had called upon the National Safety Council and the American Road Builders' Association for consulting assistance in this task since these organizations had performed similar helpful services in other states. Their recommendations are now law and a better highway system for Kansas is assured.

With the realization that a long-range road-building program would be set in motion and with a sincere desire to give the people of Kansas the best roads possible under this new program, commensurate with the cost, the engineers of the State Highway Department were in the position to try in a practical manner some of the things which they had believed possible. They believed that it was possible to improve the longevity of their roads as a result of a focused study of their concrete roads since 1941. At that time it was obvious to many Kansas engineers that some of their concrete roads were not fulfilling the part which they were supposed to play in the state highway system. This study revealed that several factors were responsible and immediately at the beginning of postwar construction, each of the then known corrective measures was adopted in the construction program.

Among these early remedial meas-

ures were (1) a general tightening of both fine and coarse aggregate requirements; (2) an adoption of subgrade strength measurements for the purpose of "tailor-making" slab thickness to fit the subgrade over which it was laid; (3) adopting the use of granular subbases to prevent subgrade pumping which had become quite prevalent since about 1940 due to the increase in total truck traffic and total truck loads; (4) the adoption of a better balanced structural slab design insofar as contraction and expansion joints, reinforcing steel and the other structural details were concerned.

However, there was further evidence resulting from this concentrated study of concrete pavements built in Kansas since 1915 that these changes in design and specifications, while a great step in the right direction, were not totally sufficient to build the long-lived concrete pavements so necessary for their rightful place in the overall scheme of a good highway system.

There existed in the engineering minds of Kansas highwaymen a question whether or not it might be possible to improve concrete pavement quality by requiring the use of cements similar to those used prior to 1930, i.e., coarser ground cements. This was one big problem to which the Kansas engineers wanted to find the answer.

### Two Test Objectives

The second problem concerned the use of sand-gravel aggregates for the construction of concrete pavements. Sand-gravel or total aggregates are an essential part of the Kansas engineers' thinking since only the eastern one-third of the state contains sufficient sources of coarse aggregate to make their use economically justified. The remainder of the state is dependent entirely upon the so-called sand-gravel aggregate for concrete construction. Sand-gravel is entirely siliceous and has very little coarse aggregate, usually from 1% to 15% by weight. The maximum size is hardly ever over ¾ in.

Concrete made with these aggregates has exhibited abnormally high expansion and as a consequence has produced "map-cracking" with resultant lower strengths than is able to withstand the traffic stresses. Since there are oil field developments in



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many parts of the western two-thirds of the state, heavy-duty pavements are advisable; hence, it is necessary to use these aggregates in the concrete pavements in much of that part of the state. The addition of puzzolanic active materials to the sand-gravel concrete is being given a field trial for the purpose of reducing expansion and keeping high strengths.

These two problems, then, are those for which it is hoped a solution will be found as a result of the construction of two concrete pavement projects. Each project contains the necessary elements to produce a positive answer and thus to eventually provide the people of Kansas with the best concrete pavements which the engineers of Kansas can build for them for their money.

### Test Projects Described

The construction of each project should be in full swing by August 1st of this year and without unforeseen developments their construction should be completed by October 15th of this year. The State Highway Commission of Kansas invites any interested parties who may be in the vicinity of either one or both of these projects to visit the project site and have a first-hand look at the character of the concrete involved and the construction methods which are being used.

Project No. I begins just south of Topeka, US-75. It is composed of a 4-lane highway separated into two 2-lane highways for most of its total 4½-mile length. This project is a test to find out if the more coarse ground or so-called "old fashioned" cements aid in obtaining greater longevity in concrete pavements than can be ordinarily expected and enable these pavements to maintain high strengths.

Project No. II consisting of 5 miles of two-lane concrete pavement is being constructed on a truck and passenger car by-pass for US-81 around McPherson, Kansas. The concrete pavement is being built with the sand-gravel aggregate common to this part of the state but which has heretofore had abnormally high expansive characteristics when used with portland cement unless treated by adding at least one-third of coarse aggregates such as limestone or coarse gravels. The details of these treatments will be further discussed as a preliminary to the description of the project itself. The current treatment which attempts to reduce these expansive properties is by the use of puzzolanic additions instead of the coarse aggregates.

In order that the reader might become well acquainted with the details of these projects, and since it is hoped that much more will be heard of each

of these projects on a national scale, each detailed project description will be preceded with some information showing the background and the reasons behind the conception of each project.

### Details of Topeka Project

#### *Features Coarse Ground Versus Modern Ground Cements*

Studies by Kansas engineers appear to have revealed the fact that the pavements which were constructed prior to the time that the present fine grinding of cements became popular, possessed more residual strengths than did the pavements constructed since fine grinding became prevalent. In 1944 an effort was made to determine why the older pavements gave the appearance of possessing higher strengths and were observed to be of sounder concrete than many pavements which had been built more recently. A program of cutting 6 x 6 ft. sections from pavements of all ages with subsequent tests for their modulus of rupture was instituted. These tests confirmed the visual observations; that the general average of strengths of concrete built in the 1920's was at a higher level than those built in the 1930's.

Conjecturing on this point, it seemed reasonable that perhaps the coarser ground cement produced in the 1920 period seemingly could leave unhydrated cement particles in the concrete as a reserve to be acted upon as the concrete aged and repeatedly became moistened. On the other hand it seemed logical that the finer ground cement would not have these larger particles as a reserve and their complete hydration took place early in their life. They attained early high strengths but over a long period of time there was no unhydrated cement particles which the concrete could call upon to maintain the desired strengths. This study created the desire among Kansas engineers to institute immediately, following the war, a project in which the concrete would contain larger particles of cement and to test the validity of the proposition that these would furnish a reserve which could be used by the concrete over a long period of time.

However, due to the large postwar construction program throughout the country and the consequent cement shortage, it was realized that such a test was impossible at that time. Interest in the subject was maintained so that early this spring the Lone Star Cement Company, whose main offices are in New York and whose midwest plant is at Bonner Springs, Kansas, near Kansas City, offered their full cooperation in an effort to solve this

problem. Mark Small, Vice President of the company at Kansas City, arranged for their Director of Research, Myron Swayze, to plan the project with Public Roads Administration represented by Frank Jackson and with Kansas engineers. However, Mr. Swayze and Mr. Jackson, after personal comprehensive postwar studies of the German Autobahn, definitely felt that the finishing and curing methods which had become standard in this country were to a rather large extent responsible for certain shortcomings of current concrete highways. It was decided in this project planning conference to incorporate into the test road, not only the variations in cement grinding and cement composition, but also construction methods of both the current practice and the practices such as existed during the decade 1920-30. These practices, however, were to be correlated with modern equipment and modern production methods.

The proposed 4-lane highway south of Topeka, Kansas, was decided upon for the site of the project. Specifications and plans were quickly prepared and submitted to all parties for approval. The project was awarded to the Koss Construction Company at a price of approximately \$700,000 which also included the grading and culverts and one small bridge. The grading is currently under construction and paving began in late summer. Three cements will be used and are currently being manufactured for this project by Lone Star's Bonner Springs plant.

**Cement No. 1:** Cement No. 1 has been termed "old-fashioned" cement, for want of a better description. It complies chemically and physically with the analysis of cements manufactured during the 1920's at this plant. The principal features of this cement are as follows:

1. The cement shall possess a raw mix fineness of approximately 90% passing the No. 200 mesh sieve.
2. The clinker shall have a maximum free lime content of 1.5%.
3. Calcination shall be accomplished by burning units using 80-85% coal and 15-20% gas. (B.T.U. Basis)
4. The processed cement shall have an SO<sub>3</sub> content of between 1.65% and 1.85% with the actual content as near 1.75% as practicable.
5. The cement shall be ground by open circuit grinding and the finished grind shall possess between 18% and 22% residue retained on the No. 200 mesh sieve.
6. The C<sub>2</sub>S content of the cement shall be between 35% and 42% with the actual content being as near 38% as practicable.

**Cement No. 2** has been termed "Modern Cement" and complies both physically and chemically with the current cement manufacture of this plant. The principal requirements for this cement are indicated below:

1. Regular grind shall be by closed circuit.
2. The maximum SO<sub>3</sub> content shall be between 2.0% and 2.5% with the actual content as near 2.25% as practicable.

3. The  $C_2S$  content of the cement shall be between 45% and 50% with the actual content being as near 48% as practicable.

4. The cement shall be ground by closed circuit grinding and the finished grind shall be between 1600 and 1800 sq. cm. per gram with an optimum of 1700 sq. cm. per gram.

5. The clinker shall be burned with gas as the fuel.

**Cement No. 3** is similar to the modern cement shown as Cement No. 2 but will have a grind similar to the old-fashioned cement—(Cement No. 1). The principles for Cement No. 3 are as follows:

1. Grinding shall be by open circuit grinding and the fineness of the finished grind shall be such that there shall be between 18% and 22% residue retained on the No. 200 mesh sieve.

2. The maximum  $SO_3$  content shall be between 1.65% and 1.85% with the actual content as near 1.75% as practicable.

3. The quantities of other compounds shall be as near those of the modern cement as possible.

A layout of the test sections are contained in the following table:

Section No.	Type Cement	Maximum Size of Coarse Aggregate	Spec. for Finishing And Curing
1	Old Fashioned	1"	1924
2	"	1"	1949
3	"	2"	1924
4	"	2"	1949
5	Modern	2"	1924
6	"	2"	1949
7	"	1"	1924
8	"	1"	1949
9	Modern Coarse Ground	1"	1924
10	"	1"	1949
11	"	2"	1924
12	"	2"	1949

Sections 13 thru 24—Round Two—Repetition of Round One  
Sections 25 thru 36—Round Three—Second Repetition of Round One

### Differences Compared

The principal differences between the 1924 and 1949 construction methods will involve the finishing and curing methods used, although there will be some differences in slumps and cement contents also. Current practice in Kansas, presumably as in other states, permits the use of membrane curing and insists upon the finishing operations being completed as rapidly as possible after the spreader and finishing machine has passed over the pavement surface. It is felt in some quarters that this practice is not conducive to the best results and that the finishing operations should be delayed to permit certain evaporation processes to take place, after which wet curing should follow to permit the concrete to use up additional water from the curing as necessary. Further, it has been felt that pavements have been opened to traffic too soon after the curing period had been completed and that certain damage results which could be prevented if traffic were held off for a longer period of time. This, no doubt, will be true of the coarse ground cements since it is anticipated that their immediate early strengths will not be as high as the modern cements but that their strength increase will be

progressive. If traffic is left off the pavement long enough for the coarse ground cement to attain a reasonably high strength, then future damage will be reduced because of its ability to maintain and to gain further strength. It is a requirement of this project that the 1924 construction method sections be completely closed to all vehicles for 30 days. Curing is to be accomplished by using damp burlap for the first 24 hours after the finishing operations are completed. After the concrete has hardened sufficiently, the burlap covering is to be removed and the entire surface covered with earth kept wet for a period of at least two weeks. The earth cover cannot be removed from the pavement for at least 20 days from the time of its application, and 10 days must elapse between the removal of the earth cover and the release to traffic.

It is entirely possible that if the pavement does not attain the desired strengths within 30 days that only passenger car traffic will be permitted and that truck traffic may have to be delayed for a period of time thereafter. Such delay in making early use of the pavement is felt by all concerned to be easily warranted if five or ten years of added good service will result from such pavement.

### Slab and Joint Details

Each of the experimental sections will be approximately 1,000 ft. long with expansion joints at 500-ft. intervals and contraction joints at 20-ft. intervals. The thickness of the pavement is 9 in., uniform section, constructed over a 6-in. granular sub-base extending the full width of the roadway from shoulder to shoulder. The expansion joints will be composed of  $\frac{3}{4}$ -in. redwood expansion joint material without load transfer features. The longitudinal center joint will consist of asphalt paper and installed by a Flex-Plane road joint machine. This was a successful feature in the construction of early pavements. Tie bars are used across the center. The pavement reinforcement will contain only  $\frac{3}{4}$ -in. marginal bars located 4 in. from each pavement edge, treated to destroy bond. In addition, each expansion joint will be flanked with a  $\frac{3}{4}$ -in. bar positioned 4 in. from the edge of the joint running transversely across the pavement. This marginal bar practice does not infer that Kansas engineers are dissatisfied with wire mesh reinforcement. This project design simply was similar to that used earlier and since this was essentially a study of concrete as a material, it was agreed the mesh should be omitted.

Only the coarse and fine aggregate type of concrete is permitted on this project, which prohibits the sand-gravel type or chat aggregate type of concrete. The fine aggregate is essentially the same now as it was during the earlier construction period. Where a 1-in. maximum size aggregate is required now, earlier a 2-in. maximum size crushed limestone was permitted. It was agreed to use each size in various sections.

Cement contents for the pavement are in two categories. A maximum of 1.40 bbl. per cu. yd. is required for the 1949 construction method, whereas a cement content of 1.60 bbl. per cu. yd. is minimum for the 1924 construction method sections.

Two 34-E Koehring pavers will be used by Koss Construction Company for the concrete work.

Thermo-plastic rubber furnished by the Carter Waters Corporation of Kansas City, Mo., will be used to seal surface of expansion joints and the  $2\frac{1}{4}$ -in. depth of contraction joints.

Adjacent to each section and at the right-of-way edge a test section 6 x 10 ft. containing separator plates will be constructed of the same concrete being used in that section, so that ten 6-ft. beams will be formed and can be removed periodically for strength measurements. Smaller test specimens will be made from each section for laboratory freeze and thaw tests. Then sonic modulus measurements will be made at the end of various cycles of freezing and thawing. Eventual modulus of rupture results will be determined by the actual machine breaks.

A recently developed Sonar apparatus will be used periodically to give a measure of the modulus of elasticity of various sections at various ages. This apparatus has been developed by the Portland Cement Association and gives promise by permitting evaluation of concrete pavements in place without destructive testing.

### McPherson Project

#### A Test Using Pozzolanic Additions

Coarse aggregates for concrete do not exist in the western half of Kansas. From an economic necessity there has been developed a type of aggregate called sand-gravel aggregate. It has been commonly used in this area as total aggregate for concrete construction for the past 30 years. The early concrete produced with this aggregate has, in general, been entirely satisfactory. Some of the older concrete pavements and structures made from this aggregate are still in excellent condition. In general, the service record of concrete using this aggregate has been equal to the serv-



ice record of concrete made from the customary coarse and fine aggregates. In order to achieve equal strength requirements, however, the cement content usually was greater than six (6) sacks per cubic yard.

About 1930 a certain type of deterioration and distress was observed on projects in which use had been made of this sand-gravel aggregate. Field studies confirmed the fact that this distress was confined to the sand-gravel aggregate type of concrete. The type of distress noted is now known as "map-cracking." Others have reported similar distress from various points over the country. This deterioration is evidenced by abnormal expansion, a series of patterned cracks, and a loss in flexural strength. The first visible evidence is usually a series of connected cracks on the surface of a pavement or on the most exposed parts of structures. The cracking starts at points of greatest exposure and deepens as deterioration progresses. It has been definitely shown by Scholer and Gibson (A.C.I. Denver Convention 1948) that this is a cement-aggregate reaction and is not restricted to the alkali-aggregate reaction about which so much has been written over the past several years. It refers to the physical and possible chemical reaction or perhaps a combination of both which has caused expansion and deterioration of concrete structures and pavements.

### "Map Cracking" Remedy

The authors referred to above have definitely shown that this type of deterioration can be reduced to a point of negligible harm by adding approximately 30% crushed limestone or 40% crushed sandstone. These remedial measures are presently specified by the State for all sources of sand-gravel aggregate where the service records or laboratory tests do not indicate that this expansion is abnormal. (Most sources are trouble makers and therefore need correction.) This means that the greater part of the sources of this material must be treated by the addition of these coarse "sweetening" aggregates. This still poses an economic problem, however, since as stated previously, the main source of coarse aggregate occurs in the eastern part of the state. It becomes an economic burden to ship even 30% of coarse aggregates 200 or 300 miles for paving projects and large structures.

Therefore, a search has been under way over the past several years to find if it were possible to treat concrete made with the sand-gravel aggregate in some manner other than the addition of coarse aggregate. In

this search, the experience with puzzolans by the U. S. Bureau of Reclamation was studied. Although their purpose in making this addition originally was for heat reduction and greater density, there were certain aspects about that work which led Kansas engineers to believe that these additions might also reduce the expansive characteristics of sand-gravel concretes. With the help of the Portland Cement Association, studies were started under Professor C. H. Scholer of the Kansas State College laboratories involving the use of puzzolanic additions. These studies have been carried on for approximately two years and have revealed the fact that these additions are beneficial and do produce concretes having more normal characteristics and having greater life expectancy.

As a consequence of these laboratory studies it was decided to make a full field test using various sources of these additions which had been proven to be satisfactory in the research laboratories and in actual practice elsewhere. Thus the McPherson by-pass pavement consisting of approximately 5 miles on US-81 around McPherson, Kansas, was chosen as the most likely location since it is in the heart of the sand-gravel area and is centrally located for the acquisition of the various puzzolanic additions which were required.

### Puzzolanic Material Defined

For clarity's sake the following definition of a puzzolanic material has been taken from the January-February 1937 issue of the A.C.I. Journal: "A puzzolan is defined as a siliceous material that in the presence of moisture will combine with lime to form a reasonable strength-producing compound. During the hydration of portland cement, lime is liberated. During the hydration of portland-puzzolan cement, the lime liberated by the P. cement constituent is consid-

ered to combine with the puzzolan."

This same issue expresses the following benefits to be derived from the use of portland-puzzolan cements: (1) improved workability, (2) freedom from segregation and water gain, (3) high factor of impermeability as compared with low-heat portland cement, (4) in comparisons with modified portland cement, a greater percentage of total heat of hydration is developed at early ages and less total heat of hydration, (5) relative high early tensile and compressive strength compared with high-early and high plastic properties, (6) long continued gain in strength.

Many of these properties in addition to the reduction in expansive properties conform with the current desires of Kansas engineers as well as other engineers throughout the country. Therefore, there is little doubt that this project will contain a large amount of national interest as it is reported from time to time.

The McPherson project was awarded to M. W. Watson, contractor, of Topeka, Kansas, for \$406,700. Paving was scheduled to begin in July this year and completed in October. The conception of the project was a result of the combined work of the Kansas highway engineers, the Public Roads Administration and the Portland Cement Association. The project itself is divided into 60 sections, each approximately 500 ft. in length. Four cements were chosen for this work as a result of the revelations brought out in Gibson's and Scholer's paper previously referred to. The table given is descriptive of the project layout and indicates the various puzzolanic additions to be used.

The puzzolanic additions in each case will replace between 20% and 25%, by weight, of the cement and will be added separately on the batch truck to be taken thereafter to the mixer. One Koehring 34-E paver will travel outside the forms and deposit

Round	Section No.	Brand of Cement	Aggregate Type	Admixture	Air entrainment
I (Sec. 1 thru 8)	1	Lone Star	Sand Gravel	None	No
	2	" "	" "	" "	" "
	3	" "	" "	Mowry Shale	" "
	4	" "	(Sweetened Sand Gravel)	None	" "
	5	" "	Sand Gravel	Fly Ash	No
	6	" "	" "	" "	Yes
	7	" "	" "	Monterey Shale	No
	8	" "	" "	" "	Yes
II (Sec. 9 thru 14)	9	" "	" "	Mowry Shale	No
	10	" "	" "	" "	Yes
	11	" "	(Sweetened Sand Gravel)	None	No
	12	" "	(Sweetened Sand Gravel)	None	Yes
	13	" "	Sand Gravel	Fly Ash	" "
	14	" "	" "	Monterey Shale	" "

15 thru 28—These two rounds are a repetition using Lehigh Portland Cement instead of Lone Star Portland Cement.

29 thru 42—These two rounds utilize Ideal Portland Cement

43 thru 56—These two rounds utilize Ash Grove Portland Cement

57 thru 60—These four sections will use sand-gravel aggregate with a new cement now in production by the Ash Grove Portland Cement Company of Louisville, Nebraska, called "PPZ" which will contain the puzzolanic admixture inter-ground with the cement. Alternate sections will be with and without air entrainment.



the concrete between the forms. An air entraining agent has been specified as a Neutralized Vinsol Resin and is added by an automatic dispenser at the mixer as called for.

The participating cement companies were chosen as indicated above as a result of earlier studies with these cements according to their reactivity or non-reactivity with the sand-gravel aggregates on the basis of expansion.\*

The puzzolanic additions as designated in the table will be shipped to the project from these sources:

The Mowry shale will come from the Laramie, Wyo., plant of the Monolith Portland Midwest Company and there is to be calcined to clinker and loaded into cars, since this plant has no provision for grinding the calcined shale. The clinker is shipped to the Monarch Cement Company of Humboldt, Kans., which will grind, sack and ship it to the project. It is required that this shale be ground to approximately 8,000 sq. cm. per gram surface area in order to achieve the desired reaction.

The "fly ash" is a recovered product from the coal-burning units in and around Chicago, and is being furnished by the Combustion By-Products Company of Chicago. It is also packaged in units of 75 lb. each.

The Monterey shale is being calcined to clinker, ground to 8,000 sq. cm. per gram and sacked at the Colton, California, plant of the California Portland Cement Company, thence shipped to the project. This firm has been producing this calcined siliceous shale for the Bureau of Reclamation but kindly consented to permit the use of a limited quantity of their production for these tests.

The neutralized vinsol resin which will be used to create entrained air in certain sections, is known as "Protex AEA" and is produced by the Autolene Lubricants Company of Denver, Colorado, supplied through Buchanan Co., Kansas City, Mo.

### Also Joint Studies

Aside from the concrete tests, this project is exploring the possibility of using a cold poured joint compound manufactured by the Prestite Company of St. Louis, called "Enamelite." Half of the joints on this project will contain this material while the other

half will contain the commonly used hot poured joint sealing compound which for this project will be furnished by the Naugatuck Chemical Company ("Sealz").

Expansion joints will be spaced at 500 ft., contraction joints, 20 ft. 44-pound reinforcement wire mesh will be used throughout and dowel-type load transfer devices using  $\frac{3}{8}$ -in. smooth round bars will be used at each expansion joint. No load transfer at contraction joints.

The pavement slab will be 9-in. uniform, placed over a 4-in. subbase composed of 70% granular material. The construction methods will be unchanged from those commonly used except for the requirements for curing. Since this project was essentially a study of concrete quality it was deemed necessary to cure with the best proven methods. For this purpose, the contractor is required to use damp burlap for 24 hours on the concrete after initial placement, to be followed with at least 2 in. of wet earth upon removal of the burlap. The wet earth is to remain until the test specimens have acquired a modulus of rupture of 500 psi. Under normal conditions, this will take approximately 10 days; however, it is anticipated that the puzzolanic additions may be slow in gaining early strength and therefore this period may need to be longer.

As can be inferred, the coarse aggregate and fine aggregate mix is prohibited on this project since it is strictly a study of sand-gravel type of aggregate. This type is quite common to the surrounding states of Nebraska and Iowa as well as to Kansas. A maximum of  $5\frac{1}{2}$  gal. of water per sack of cement and a minimum yield cement factor including the puzzolanic admixture of 1.60 bbl. per cu. yd., are among the requirements. In view of the fact that this sand-gravel type of aggregate contains more air normally than does a coarse and fine type of concrete, it was necessary to specify air contents of between 6% and 9% in those sections where air entrainment is wanted. This will achieve a result similar to the customary 3% to 6% air weight required in coarse and fine aggregate concretes. The air contents specified for these sand-gravel mixes were determined as a result of experimental work performed in the Portland Cement Association Laboratories at Chicago, for the Highway Commission.

Cast-in-place test sections are required adjacent to each section with the right-of-way outside of the drainage facilities. These test sections will have the same general properties as

the concrete pavement with dimensions of 6 x 10 ft. Parting strips are placed within this slab to enable the engineers to periodically remove 10 full sized beams having a 6-ft. length. These will be removed for purposes of testing for strength and other properties necessary for the examination of structural concrete. The customary 6-in. x 6-in. x 36-in. concrete beams will be made for each section for daily control of strength and for the end of the curing period.

Special plugs have been designed and built to be inserted in the side of the pavement concrete through the forms, for purposes of measuring expansion or contraction with a 20-in. strain gauge. Measurements will begin immediately upon removal of the forms from the side of the pavement and will be continued periodically over a number of years. More than 2,000 small test specimens will be formed for these 60 sections for the express purpose of measuring the expansion of the various types of concrete. Here again, plugs have been devised to be inserted in these specimens so that expansion can be accurately measured. The small test specimens will be transported to the laboratory and subjected to the wetting and drying tests so successfully developed by Gibson for the purpose of accelerating the expansion of this type of concrete. These specimens will be 3 in. x 4 in. x 16 in. and have been so designed as to make use of special molds which were used in this research work during the period 1942-45. The Sonar apparatus for Project No. I will also be used for this project, which will enable Kansas engineers to study the deterioration or the improvement in these various concretes without destructive testing.

### Wide Interest Anticipated

Observers from the Portland Cement Association and the Bureau of Public Roads will be stationed at both projects during construction.

The prime objective for both of these projects is to improve the durability and quality of the concrete pavements to be built for the people of Kansas over the next 20-year period. The Kansas engineers are certain that this can be done and have great hopes that in each of these projects there is a means included which will accomplish this. However, it is also felt that these results will be useful to all agencies which use concrete as a material for construction and they are therefore invited to make any inquiries or, if in the area of these projects, to visit them for the purpose of seeing this work.

(Continued on page 74)

\* The Lone Star portland cement will be produced by the Lone Star Cement Company from their plant at Bonner Springs, Kansas. The Lehigh Portland Cement will be produced by the Lehigh Portland Cement Company at Iola, Kansas. The Ideal Portland Cement will be produced by the Nebraska Cement Company in their plant at Superior, Nebraska, and the Ash Grove Portland Cement will be produced from their plant at Louisville, Nebraska, which will also produce the interground Portland Puzzolan Cement designated as "PPZ".

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# Skillful Scraper Work, Vibratory Compaction, Speeded Grading at Detroit Wayne Airport

**Flat terrain and difficult soil and drainage conditions posed problems in grading for 1700-acre airfield extension; pumping plant and ponding system aid extensive pipe drainage**



★ Subgrade densification in progress at the Detroit-Wayne airfield, using the Cedarapids vibratory compactor

**H**OW to grade an airfield site economically where the work consisted mostly of small dabs and shallow skimming, was just one of the problems faced by the contractors at Wayne Detroit Major Airport. A companion problem was that of obtaining 95% modified AASHTO density under pavement areas, despite the heavy clay content of some of the soil, and persistence of excess moisture.

This article will be confined to the grading and drainage, which was recently completed for the first phase of a 1700-acre layout ultimately to include six concrete runways. How a group of contractors in a joint venture are placing 3500 to 4000 lin. ft. of 20 ft. by 11 or 13 in. slab per day on three runways, using three pavers and material plants, will be covered in a separate article.

The present construction work is part of a program by the Wayne

County Board of Supervisors to create a modern field for Detroit's airline traffic, now coming in at Willow Run. The site is adjacent to the old Wayne County airport, 16 miles southwest of downtown Detroit. Known during the war as Romulus airbase, the old 590-acre field has three small runways paved in 1930 and 1931.

The first work on the new field was the construction of a large open ditch around the perimeter, designed to replace two ditches traversing the site. Contract was awarded to G. F. Taft, of Northville, Mich., involving 105,000 cu. yd. at 42c and other items totaling \$80,000. Taft began the ditch early in 1948, taking out the first 2½ or 3 ft. depth of material with a Euclid loader and wagons. Ditch excavation was completed using a 1½ and a 1 yd. dragline and wagons. Excavated material was used to fill the existing ditches. The job was completed by August.

In April, 1948, Taft also was awarded a \$64,000 contract for grading two runways. This job included 130,000 cu. yd. of excavation at 40c, most of it involving less than two feet depth of cut or fill. The same contractor also was awarded still another contract for grading a 168-acre ponding area at the east edge of the field, and one runway at about \$70,000, including 152,000 cu. yd. at 29c.

## Job Complications

The contractor graded the NW-SE runway and the ponding area in one operation, utilizing his Euclid loader

and wagons, and also working several Le Tourneau and Caterpillar scrapers with D8's on short hauls. Despite good equipment the yardage came slowly, due to two factors. One was the persistence of high moisture content, which in places was found to vary only one or two percent between the hot, dry summer and the spring rainy season. The relatively flat terrain added to the moisture difficulties, as will be discussed in the section on drainage.

Runway grading sections are 500 ft. wide (pavement to be 200 ft.). The material consisted of poorly drained clay loam known locally as Brookston soil, interspersed by areas of beach sand known as Avondale. Some intermixing was achieved during grading. In the main the completed subgrade for this runway consisted of material rated at E-6 (CAA classification).

Also complicating the job was the fact that most of the grading consisted of moving small yardages for considerable distances. The Taft organization, although primarily road-builders, soon became accustomed to the problem of performing shallow skim grading over an area "as big as several farms."

Then work shut down for the winter. Early in 1949 Taft began on the E-W and the SW-NE runways. This time he was able to greatly speed up the work because of the lighter soils and also because he had acquired two new electrically operated 16½-yd. Tournapulls (a third unit was add-

## Feature Section

### Earth Moving and Compaction

*The following 11 pages are devoted to articles on subject matter having to do with this important topic. Each of the articles contains data of value to both engineers and contractors. Next month: Bituminous Paving Practice.*





★ Vibratory compaction procedures were varied to meet constantly changing soil conditions. Note 4-in. depression made by single passage in semi-compacted soil



★ The grading contractor here believes in advertising. With Mr. Taft is airport engineer J. D. Benjamin

ed during the summer). These machines finegraded the NW-SE runway roughed out the previous season, without pusher help and with relatively little use of a grader. They also moved almost the entire yardage on the two additional runways, performing the bulk of the fine-grading with the help of one Caterpillar No. 12 motor grader. These machines drew

special praise for their effectiveness in the extensive light skimming involved. Runway grading included the formation of a succession of small ponding areas flanking the paved strips.

Later in the summer the pans were employed to haul subgrade blanket course sand a distance of two miles and spread it in advance of the concrete paving operations. The four-mile

round trip, including push loading and spreading, averaged twenty minutes.

Taft was awarded one other contract,\* for approximately \$25,000, which included 25,000 cu. yd. of perimeter grading. This grading went for 70c. The work was done with a tractor-drawn scraper, self-powered scraper and motor grader. This contract will dress up the area between the drainage ditch and the adjoining road by clearing and grading it and making necessary drainage adjustments.

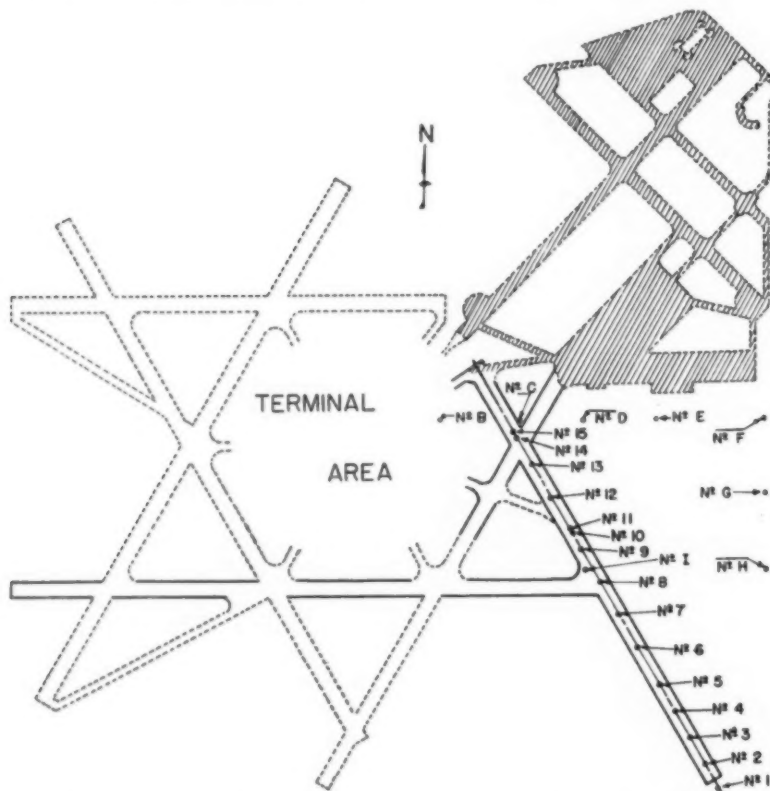
### Compaction Problems Varied

Compaction was an endless source of trouble all through 1948. Moisture in the clay and clay-loam cuts remained almost constant at between 18% and 20%, 12% being optimum for modified proctor.

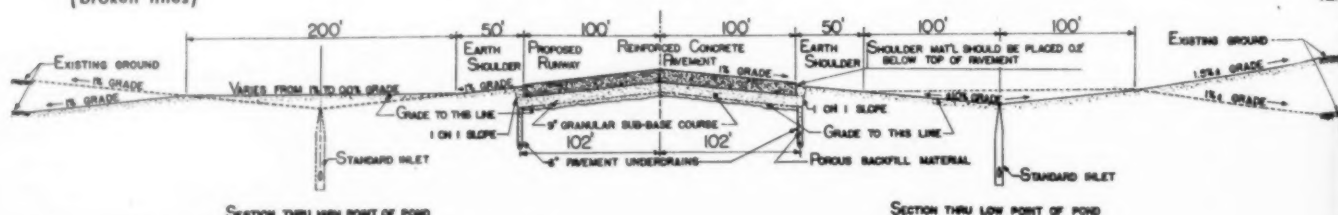
Areas running relatively high in sand proved difficult to roll with sheepsfoot rollers, due to "fluffing out". Areas high in clay would not densify to better than 90% to 92% modified proctor despite the use of every means available on the job. In addition to sheepsfoot rollers, pneumatic rollers and Euclid wagons loaded with sand were also tried. The problem had not been solved satisfactorily when work shut down late last year.

On resuming grading this spring Mr. Taft, with permission of the engineers, put a Cedarapids compactor on the project. Due to the soil conditions it was drawn by a D8 Caterpillar instead of a wheel type tractor as usually recommended. This com-

\*Further grading to be accomplished under subsequent contracts.



★ General layout of Detroit Wayne Major Airport, showing old Romulus Field (shaded), current program (solid lines) and ultimate improvements (broken lines)



★ Cross-section through one runway, showing pond areas



Soil Group Lab. N <sup>o</sup>	Class	Soil Identity	No. of Test Made	Liquid Limit	Plasticity Index	Shrinkage Limit	California Bearing Ratio	C.A.A. Density	Optimum Moisture
1	E-2	Sand	3	18-26	0	0-18	16-25	119-129	7.8-11.1%
2	E-3b	Sandy Loam	3	25-29	0-9	17-18	2-5	117-122	9.0-13.6%
3	E-5	Sand & Silt	1	33-34	8-9	18	3	113-114	14.4%
4	E-6	Silt & Clay	11	26-49	9-25	13-19	2-7	110-127	10.0-16.2%

★ Range of soil constants from laboratory test, Detroit Wayne airport

pactor unit weighs 10 tons empty and up to 34 tons with ballast. Its weight is carried on two 24"x31" tires spaced on 6-ft. centers. The axle is vibrated when desired at a rate variable from 700 to 1400 vibrations per minute. Tire pressures can be made to vary between 50 and 100 psi.

The three variables—weight, vibration period, and tire pressure—were subjected to experimentation by the contractor, who devoted much personal attention to familiarizing himself with the best usage of this machine, with the result that subgrade for this year's paving, totaling 360,000 sq. yd., was densified to meet the specification requirements.

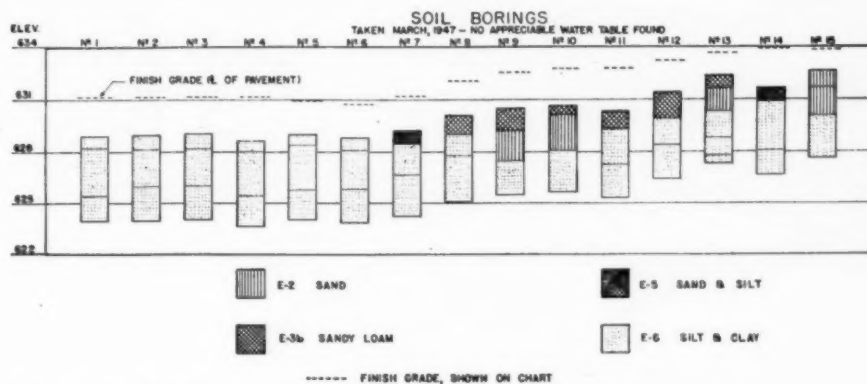
### Compactor in Light Soils

In lighter soils satisfactory density was usually obtained in two passes, despite high moisture content. Local areas were found to be compacted as high as 102% "modified" density, although this figure was exceptional.

The compactor, while designed primarily for granular soils, was also used over the heavier soils. More passes were required in heavier soils, and when satisfactory density was not achieved in four or five passes, it usually was found that additional passes would not do any good at the time. Often it became necessary to delay rolling until some drying out could take place, although most of the field was eventually rolled while well on the wet side of optimum.

In operating the compactor the three variables were constantly adapted to fit the conditions encountered, utilizing experience which the contractor amassed as he went along. In lighter soils, on a typical day, for example, the machine was set at 1200 vibrations per minute, with 70 lb. air in the tires and 32 tons gross load. The operator would block out working areas and make a succession of round trips, each tire path slightly lapping the path made previously. Three trips were necessary to close the

★ Caterpillar tractor and Caterpillar grader on general leveling work



★ Chart of soil classification, as found from numbered borings shown on the general layout. Note variable soil conditions

tire span and resulted in a 12-ft. coverage.

An important result of the use of the unit was the way it showed up previous trenches and other weak subgrade areas which had not become satisfactorily compacted in the lower depths. Where these ditches were found the material was removed and backfill of sand was made to ensure proper bearing value. In the case of other weak areas, the situation was generally corrected by aeration.

Compaction progress often hinged on the progress of other parts of the work. The contractor had a free hand in experimenting to make the best use of the compactor, under a specification which defined only the

end result and placed no restriction on the method of getting densification. Precise unit costs are not available, although the average cost for all soils is reported to be in the neighborhood of one cent per square yard, compared to as much as three cents expended per square yard without always achieving the required density by the other methods tried.

### Extensive Drainage Installed

The engineering picture at the new Wayne Detroit Major Airport is incomplete without a discussion of the drainage problem and the unusual system installed. The new field is designed for 100,000 lb. maximum wheel load. The 11 and 13 in. con-

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★ New electrically operated Tournapulls helped grade and fine grade runways; then stayed on to move subgrade sand for one of the paving outfits. Shown here loading at the sand pit, and also spreading alongside a completed pavement lane

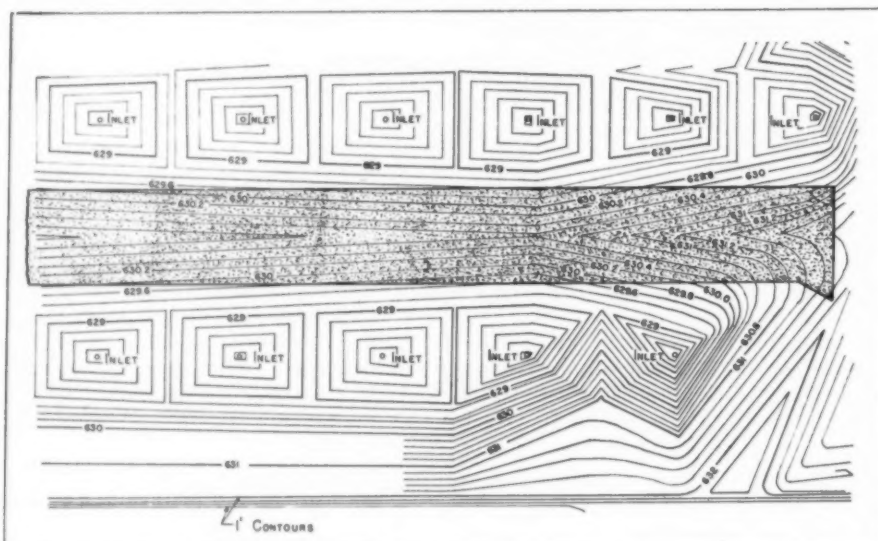




★ Perimeter ditch leading to pumping station, built around the field to replace natural drainage channels. Outlet gates at left lead to outfall ditch



★ Control gate for releasing water from the 168-acre pond area into perimeter ditch



★ Contours of small ponds flanking the runways

crete slab will have a 9-in. sand base. This design presupposes that the sub-grade will be kept relatively stable by effective collection and removal of storm run-off. An excellent precedent for the design is found in the successful record of the old adjacent airfield, whose 9-in. concrete runways, laid directly on the clay, have seen 18 years of service. Despite heavy use by the Ferry Command during the war, they are in good condition today, a fact credited partly to the unusually extensive under-drainage installed throughout the flat terrain.

The Wayne County and CAA engineers wisely capitalized this experience in designing the new field. The 1930 drainage installation, grid-ironing the entire  $\frac{3}{4}$ -square-mile field, consisted of lines of 6-in. tile spaced two rods apart; alternate lines were located at 12-in. depth below the pavement surface, and at 3 to 4 ft. depth. Over a million lineal feet of tile was used. The "high" lines feed at intervals into the "low" lines, which lead to outfall ditches.

While the system probably has some value in intercepting ground water,

despite the practically impervious soil, its main function has been that of thoroughly and promptly removing storm water. The granular backfill employed has functioned for two decades with no apparent lessening of effectiveness. It is significant to note that the only pavement failure experienced to date is confined to local areas where the old drain lines were disrupted and blocked during a wartime apron extension job. Old lines have been tied in systematically with drains installed for the new field area.

#### Drainage for New Field

The new enlarged field area, which is roughly two miles on a side, has about 8 ft. of fairly uniform fall from west to east, and practically zero fall north to south. Runways will include several sections of zero grade; surface drainage being dependent on the 1% transverse slope from centerlines.

The drainage scheme consists of the following elements:

1. Perimeter ditch.
2. Ponding system.
3. Storm collector system.
4. Pumping system.

1. The perimeter ditch has been discussed above.

#### Ponding System

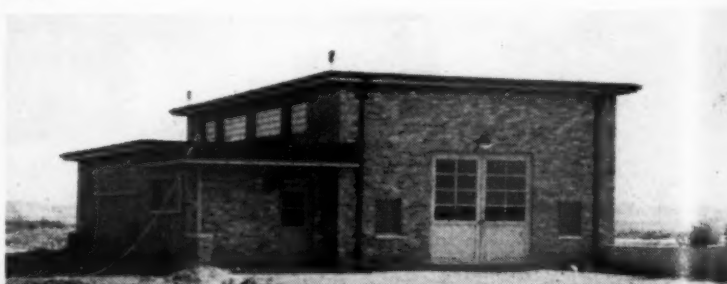
2. Gates are located in some of the lines, to retard flow, as a further protection to the pumps. Because of the retarding scheme the drain lines themselves are smaller than normally would be selected for the conditions.

Finally, on reaching the main pumping station at the east end, peak storm water is stored in a 168-acre emergency pond equipped with vertical sluice gates for controlling release into the perimeter ditch and/or outfall ditch.



★ Post holes were dug one-a-minute for the Cyclone property fence around the field, using a farm tractor with auger driven from power take-off

★ The pumping station was designed along modern lines





★ Contours of graded surface of 168-storage pond, and location of perimeter ditch and pump house in relation

A series of pond areas provided for the entire field. This system, which greatly reduces the field's pumping as well as drainage line capacity requirements, provides for storage of peak run-off and is the result of painstaking study by the Wayne county engineers. A succession of small ponds are located opposite each pavement edge, with a catchbasin in the center of each, as described under the succeeding heading.

### Storm Collector System

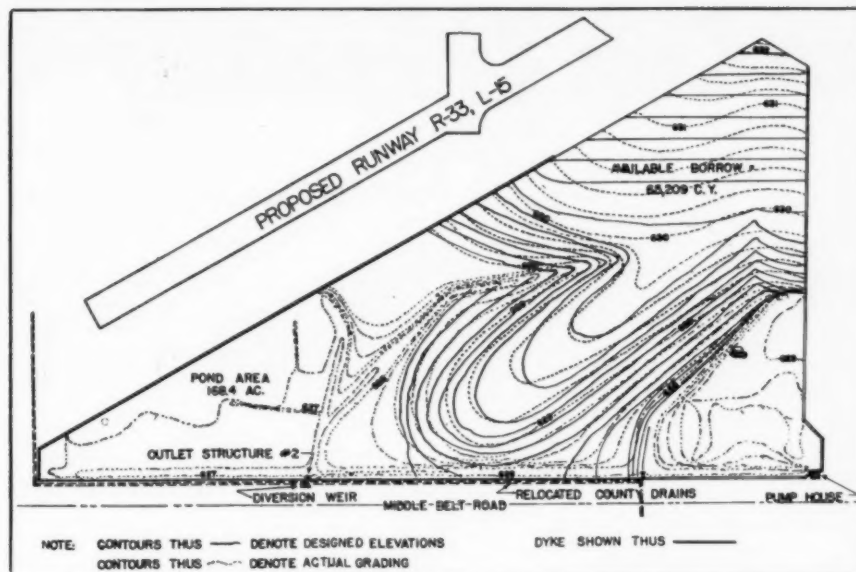
3. Storm water from paved areas enters catch basins located at about 300-ft. intervals and 150 ft. from runway edges. Flow is taken from the field by two main trunk collectors, constructed of reinforced concrete pipe graduating from 12-in. drain, up to 66 and 72 in., respectively. About 100,000 lin. ft. of pipe is included. Pipe is back-filled with excavated material except where the lines cross paved areas. These were backfilled with sand.

Edge drains. About 41,000 lin. ft. of 6-in. open joint vitrified tile is placed in this system. These are located 2 ft. out from pavement edges and lead into the storm collectors. The trenches are gravel backfilled to a height of 12 in. and the remainder of the depth with sand of the same type as used for pavement subgrade blanket.

### Pumping System

4. The pumping station is quite a project in itself, costing \$195,000. It consists of five Peerless pumps housed in a modern brick structure. Pumps include one of 25 cfs. capacity, two 50, one 75 and one 100, plus a small sump pump. A stand-by power plant is to be provided in case of utility line failure.

In addition to the ditch and pond grading contracts executed by G. F. Taft, as described earlier, a \$539,000 contract was awarded to Base Line



Construction Co. and United Contractors for installing the storm collectors. Edge drains were installed after grading the field, by Boam Company as a subcontract under the paving contract.

### Acknowledgments

The Wayne Detroit Major Airport is being constructed by the Wayne County Board of Supervisors with Michigan Department of Aeronautics and Civil Aeronautics Administration participation in financing. Leroy C. Smith is airport manager; Henry E. Baker, airport superintendent; J. D. Benjamin, airport engineer; Paul Glaser, asst. airport engineer. Ole Drayton superintended for G. F. Taft.

★ Over 99,000 lin. ft. of concrete pipe was required for storm drains

### Clearing House Section Outstanding Used Equipment Values

Over one hundred fifty individual advertisers feature an exceptionally large selection of used equipment in the 11-page "Clearing House" section which starts in this issue on page 100. Readers will find the "Clearing House" a dependable and informative directory of outstanding values in used equipment and we suggest that you make perusal of these pages a regular habit each month. At any time that you have equipment you wish to sell, anywhere in the country, we suggest that you present your offerings in our "Clearing House." This section is growing faster, getting larger every month because it's doing a better, quicker selling job—at one low cost!



★ Trenching and backfilling for edge drains. Note power belt attachment located below tail gate



# Cost Estimating

## for Owners of Power Excavators

**I**N answer to constantly increasing demand for data on cost estimating, the Power Crane and Shovel Association has issued Technical Bulletin No. 2, entitled "Operating Cost Guide."\* Covering cranes from 2½ to 50 tons and power shovels, hoes, draglines and clamshells ranging from ¾ to 2½ yd., this summary analyzes the cost elements which owners must consider for profitable operation. Allis-Chalmers Manufacturing Co. (Tractor Division), The Buda Company, Caterpillar Tractor Co., and International Harvester Co. personnel collaborated in the bulletin's preparation.

According to the Association's Secretary, Herbert S. Blake, Jr., the problem of analyzing these costs in their true perspective has often come up among various owners of such equipment and it was thought that a study of this kind would afford an excellent opportunity to present clear thinking on the subject in accordance with best methods of current-day practice. The members of the Power Crane and Shovel Association have, therefore, collaborated their efforts and drawn upon their common experience to present a clear and rational approach to the subject of cost determination. It is hoped that the methods outlined will assist some of the individual owners in formulating more accurate appraisal methods.

Aside from being of value to construction equipment owners, the breakdown of these costs should be of interest to contracting engineers, cost estimators, highway and public works administrators, plant and material handling engineers and engineering students majoring in construction methods and equipment.

### Fixed Cost Elements

Computation of the total investment or cost of the equipment is a basic requirement. This includes the items of price f.o.b. factory, freight, unloading and erecting, moving to the job.

**Factory Price.** This should cover the complete machine with all variable equipment and accessories.

**Freight.** Add to f.o.b. factory price.

\*Price 50c. Address Power Crane and Shovel Association, 74 Trinity Place, New York 6, N.Y. Complimentary copies available to engineering colleges.

**How to estimate the cost of ownership and operation of your excavators is outlined in the following article, which summarizes with permission the Power Crane and Shovel Association's copyrighted bulletin, "Operating Cost Guide"**

Use actual shipping weight and published freight rates, if available; otherwise for general estimating within the U.S. use \$1.25 per 100 lb. of weight as an average.

**Unloading and Erecting.** Labor and material costs roughly estimated in Table 1. Labor assumed to be 2/3 unskilled.

Table 1—Unloading and Erecting Costs

Machine	No. Cars	Domestic No. men required	Man Hours	Material Cost	No. men required	Export Man Hours	Material Cost
¾	1	2-3	20	\$ 30	4-6	125	\$ 70
¾	1	2-3	25	30	4-6	150	70
¾	1	2-3	25	30	4-6	160	70
1	1	3-4	35	40	4-6	200	85
1½	1	3-4	35	40	5-7	225	100
1½	1	3-4	35	50	6-8	250	120
2	2	4-6	100	120	6-8	400	170
2½	2	4-6	100	150	8-10	500	230

Using local labor rates the above will give a fair estimate although the cost of unloading material will vary with the market prices and locality.

**Moving to Job.** This may involve clearing right of way, moving overhead wires, and other special costs.

### Recapitulation:

Price f.o.b. factory.....	\$.....
(Complete machine & accessories)	
Freight to destination.....	\$.....
(Average for estimating \$1.25/100 lbs.)	
Unloading & Erecting.....	\$.....
(Labor and Material)	
Moving to Job.....	\$.....
(Clearance of right of way, etc.)	
Total Cost or Investment.....	\$.....
(On the job ready to work)	

**Estimating Depreciation.** The useful life of excavating equipment, for average purposes, is given in Table 2. (Data for cranes do not necessarily relate to the machines by size in cu. yd.)

Table 2—Average Useful Life (economic life) Shovels and Hoes

Shovels and Hoes			
¾-¾ cu. yds.	5 years	or	10,000 hours
1-1½ cu. yds.	6 years	or	12,000 hours
2 cu. yds. and over	8 years	or	16,000 hours
Dragline—Clamshells—Cranes			
Cu. Yd.	Tons	Years	Hours
¾-¾	2½-5	5	10,000
1-1½	10-15	9	18,000
2 and over	20 and over	12	24,000

One year of service on the basis of 40 hours of operation per week is equivalent to approximately 2000 hours per year and is generally accepted as normal usage. Whether or not the hours indicated would be accepted in place of years for Income Tax purposes where equipment is operated more than an average of 40 hours per week, is a question that would have to be verified, as the method to be used for depreciation for greater than normal usage is not clearly defined.

While 2000 hours per year is generally accepted as normal usage, many such machines will operate more than 2000 hours per year. This is especially true of the larger sizes which may be operated double or triple shift. Machines which operate more than

2000 hours per year, even though the usage occurs through overtime, Saturday or Sunday work, should be allowed additional depreciation.

It has been suggested that a rate or charge for depreciation be established per hour for the first 2000 hours (normal usage) per year, and that ½ this rate be added for hours use beyond the first 2000 hours up to 4000 hours per year, and ¼ of the first rate for the hours beyond 4000.

However, it is understood that accelerated depreciation for Income Tax purpose follows very detailed and exacting rules and regulations and in no event will more than 140% of normal annual rate be allowed per year.

(Continued on page 62)

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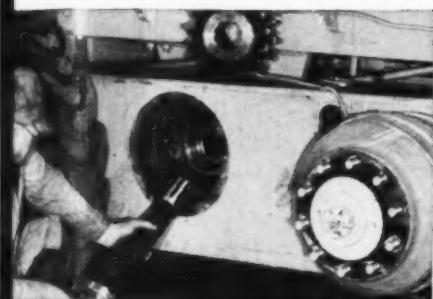
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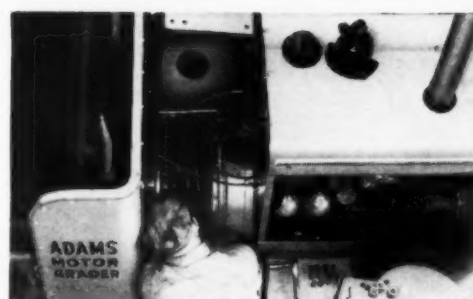






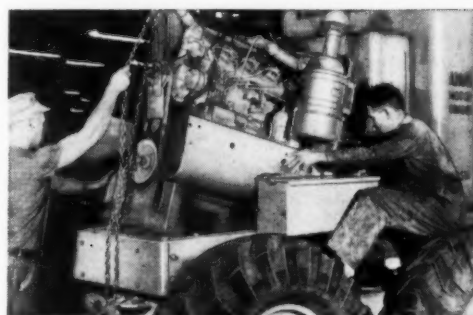
REAR AXLE is replaced by one man in 2 to 4 hours.

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TRANSMISSION can be removed by two men in 2½ hours or less.

ENGINE is removed by two men in 3 hours or less.



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(Continued from page 58)

Table 2 does not of course represent the actual useful life. Many machines have a longer or shorter useful life but for accounting or estimating purposes, the table gives average representative figures.

No credit has been taken for salvage value at the end of economic life, as this class of equipment is commonly relegated to a period of light duty or standby service before it is scrapped.

The Straight Line method of figuring depreciation is used here. This method is in general adequate for this purpose. However, if it is desired to take changing prices for equipment into account in estimating, an annual appraisal to determine a current value should be considered.

Calculate percentage of total investment to use per year or hour for straight line depreciation as follows:

$$\frac{\text{Total Cost or Investment} = 100\%}{\text{Life in yrs. or hrs.} = \dots\% \text{ per year or hour}}$$

An example for 5 years or 10,000 hours:

$$\frac{100\%}{5 \text{ or } 10,000} = (20\% \text{ per year or } .01\% \text{ per hour})$$

Therefore, for the years and hours used in this bulletin we secure the percentages of depreciation for the various groups given in Table No. 3.

Table 3—Depreciation Rate

Years	Hours	% per year	% per hour
5	10,000	20%	.01%
6	12,000	16.67%	.00833%
8	16,000	12.5%	.00625%
9	18,000	11.11%	.00555%
12	24,000	8.33%	.00416%

**Interest, Taxes, Insurance.** These items together are usually taken at 10% of the average investment—6% interest; 4% taxes, insurance, storage and incidentals.

Average investment must be established based on the number of years used for depreciation. Since the first year is considered at 100% and since the investment is considered at the beginning of each year, the method of calculating average investment for a 5 year depreciation period is as follows:

1st year	100% of Total Investment
2nd year	80% of Total Investment
3rd year	60% of Total Investment
4th year	40% of Total Investment
5th year	20% of Total Investment
	300% of Total Investment

Average Investment =

$$\frac{300\%}{5} = 60\% \text{ of Total Investment}$$

Or the general formula for calculating Average Investment is:

$$\frac{\text{Average Investment} = \frac{1}{2} \times (n+1) \times 100\%}{n} = \% \text{ of Total Investment.}$$

(Where n = number of years in depreciation period.)

The percent of Total Investment to use for Average Investment for the

groups considered in this bulletin are as follows:

No. Years Depreciation	% Av. Investment Per Yr.
5	60%
6	58.33%
8	56.25%
9	55.5%
12	54.2%

Therefore, the percentage of Total Investment per year and per hour to use for interest, insurance, taxes, and storage, based on 10% of average investment for the groups considered here is as shown in Table 4.

Table 4—Interest, Insurance, Taxes, Storage 10% of average investment per year

% Average Investment Per Year	Years	Hours	Per Year	Per Hour
60%	5	10,000	6%	.003%
58.33%	6	12,000	5.83%	.00292%
56.25%	8	16,000	5.625%	.00281%
55.5%	9	18,000	5.56%	.00278%
54.2%	12	24,000	5.42%	.00271%

#### Repairs, Maintenance, Supplies.

These items, including labor directly associated to the items but not operating crew labor, for shovels and hoes is taken at 100% of the total investment, spread over the economic life of the machine.

Thus the percentage for these items for shovels and hoes is the same as the percentage for Depreciation. However, 80% is used for Dragline and Clamshells, and 60% for Lifting

will make a large difference in the amount of maintenance and repairs required. Third, these expenses are not uniform each year. Provision should be made for a periodic general overhaul, and it should be expected that both the amount of repairs required and the losses caused by shut-downs will increase as the equipment becomes older. See Table 5 for resume.

For example: Assume a % cu. yd. shovel total cost at \$10,000. Repairs, maintenance and supplies = \$10,000

x .0001 = \$1.00 per hr. Assume this shovel can excavate 45 cu. yds. per hour — repairs, maintenance and supplies = \$1.00 = \$.022 per cu. yd.

45

Assume a 2½ cu. yd. shovel total cost \$60,000. Repairs, maintenance and supplies = \$60,000 x .0000625 = \$3.75 per hr. Assume this shovel can excavate 300 cu. yds. per hour repairs, maintenance and supplies \$3.75 = \$.0125 per cu. yd.

300

#### Operating Costs

##### Engine Fuel and Operating Oil

**Fuel.** A formula for estimating the approximate gasoline or diesel fuel consumption for equipment of this type is as follows:

$$\text{BHP} \times \text{Factor} \times \text{lbs. fuel per hp. hr.} = \text{gal. per hr.}$$

Where

BHP = Brake hp. of engine—or rated hp.  
Factor = Factor for this use, 50 to 60%.  
Gasoline = 0.7 lbs. per brake horsepower hr.  
Diesel = 0.5 lbs. per brake horsepower hour.  
Gasoline = 6.2 lbs. per gallon (U.S.)  
Diesel = 7.3 lbs. per gallon (U.S.)

From this formula one obtains an approximate gasoline consumption of 0.056 to 0.068 gallons per horsepower-hour (based on 50% or 60% factor respectively) and an average of about 0.06 g.p.h.h. is suggested. Diesel fuel consumption is about 0.034 to 0.041 gal. per hp-hr.; use of an average of 0.040 g.p.h.h. is suggested.

The above approximate fuel consumption figures are based on normal operations at normal altitudes above sea level and are based on horsepower developed. For high altitudes the consumption is in proportion to the horsepower developed.

Shovels normally will consume a greater amount of fuel than the other types of machines considered here. Therefore, the larger consumption rate indicated should be used for estimating fuel for shovels and the small-

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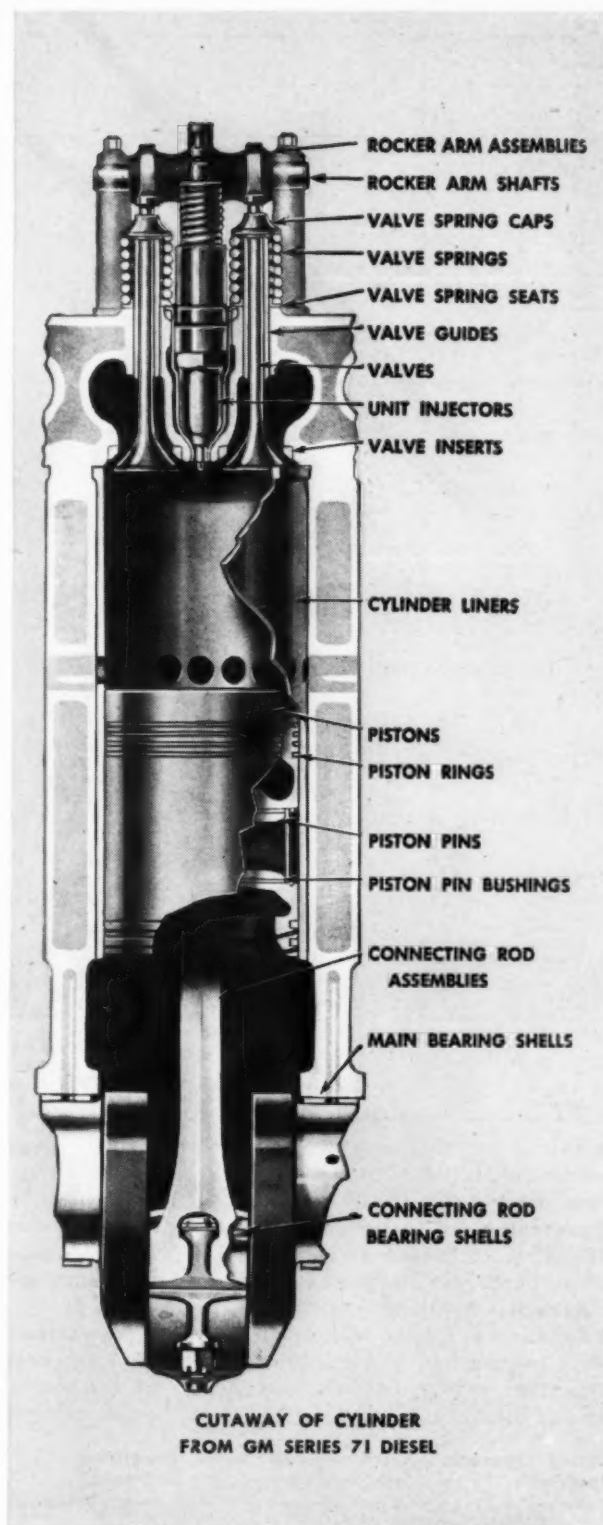
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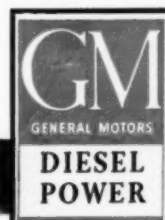


## DETROIT DIESEL ENGINE DIVISION

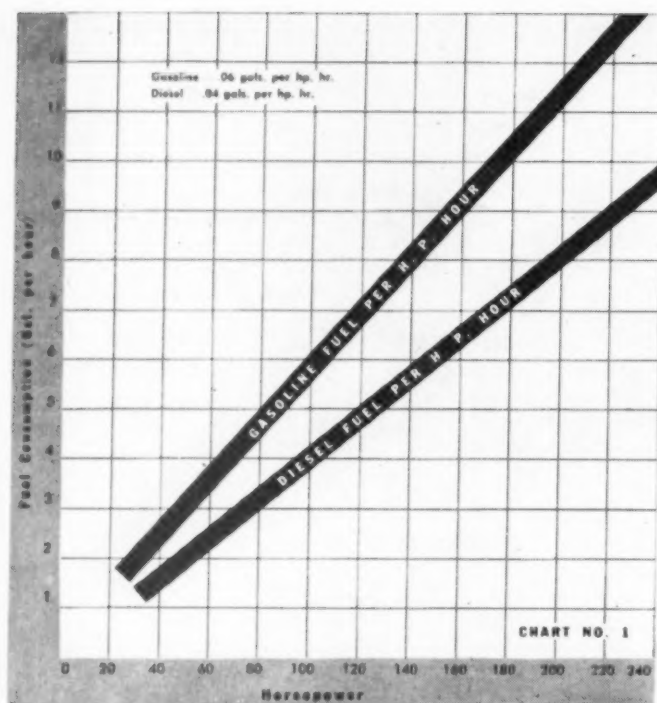
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★ Fuel consumption per hour of gasoline or diesel engines in excavator service

Table 5—Repairs, Maintenance and Supplies (including labor associated with them)

Cu. Yds.	Years	Hours	Per Year	% of Total Investment	Per Hour
Shovels and Hoes (100% of Total Investment spread over life of machine)					
3/8-3/4	5	10,000	20	%	.01 %
1-1 1/2	6	12,000	16.67	%	.0083 %
2-2 1/2	8	16,000	12.5	%	.00625 %
Dragline—Clamshells (80% of Total Investment spread over life of machine)					
3/8-3/4	5	10,000	16	%	.008 %
1-1 1/2	9	18,000	8.89	%	.00445 %
2-2 1/2	12	24,000	6.66	%	.00333 %
Lifting Cranes (60% of Total Investment spread over life of machine)					
2 1/2-5	5	10,000	12	%	.006 %
10-15	9	18,000	6.67	%	.00333 %
20 and over	12	24,000	5	%	.00250 %

er rate for draglines and clamshell machines. Machines used for lifting crane service only, usually operate intermittently and fuel consumption is difficult to estimate but generally is not an important consideration.

**Example:** A 100-hp. engine in shovel service is estimated to consume per hour:  $100 \times .068 = 6.8$  gals. per hour of gasoline or  $100 \times .041 = 4.1$  gals per hour of diesel fuel.

#### Hourly Operating Cost—shovels, hoes, draglines, clamshells (1/2 to 3/4 yd.) and cranes (2 1/2 to 5 tons)

(Economic Life: 5 years or 10,000 hours. Total cost or total investment = 100%. Average investment = 60% per annum).

	Cost in % of Total Cost Per Year	Total Cost Per Hour
1. Depreciation.....	20 %	.01 %
2. Interest, taxes, insurance (10% of av. inv.).....	6 %	.003 %
Total (1 & 2).....	26 %	.013 %
3. Repairs, maintenance, supplies		
(a) Shovel & hoes = 100% of total cost over life of machine.....	20 %	.01 %
(b) Dragline or clamshell = 80%.....	16 %	.008 %
(c) Lifting cranes = 60%.....	12 %	.006 %
Total fixed costs		
(1) + (2) + (3).....	46 %	.023 %
(b) Dragline & clamshell.....	42 %	.021 %
(c) Cranes.....	38 %	.019 %

Add cost of engine fuel, lubricating oil, and labor—(operating crew)

#### Hourly Operating Cost—shovels and hoes (1 to 1 1/2 yd.)

(Economic Life: 6 years, or 12,000 hours. Total cost or total investment = 100%. Average investment = 53 1/3% per annum).

	Cost in % of Total Cost Per Year	Total Cost Per Hour
1. Depreciation.....	16.67%	.00833%
2. Interest, taxes, insurance (10% of av. inv.).....	5.833%	.00292%
3. Repairs, maintenance, supplies, shovels and hoes = 100% of total cost over life of machine.....	16.67 %	.00833%
(1) + (2) + (3)—Total Fixed Cost.....	39.17 %	.0196 %

Add cost of engine fuel, lubricating oil, labor (Operating crew)

#### Hourly Operating Cost—draglines, clamshells (1 to 1 1/2 yd.) and cranes (10 to 15 tons)

(Economic Life: 9 years, or 18,000 hours. Total cost or total investment = 100%. Average investment = 55.5%).

	Cost in % of Total Cost Per Year	Total Cost Per Hour
1. Depreciation.....	11.11%	.00555%
2. Int. taxes, insurance, storage, invest. (10% of av. inv.).....	5.55%	.00277%
(1) + (2).....	16.66%	.00832%
3. Repairs, maintenance & supply		
(a) Clamshell & dragline = 80% of total cost over life of machine.....	8.89%	.00444%
(b) Cranes = 60% of total cost over life of machine.....	6.67%	.00333%
Total Fixed Costs		
(1) + (2) + (3).....	25.55%	.0128 %
(a) Clamshells & draglines.....	23.33%	.0117 %
(b) Cranes.....		

Add cost of engine fuel, lubricating oil, labor (operating crew)

the machine. If storage, haulage, re-handling are involved, extra costs should be estimated for these.

**Auxiliary Fuel** costs for gasoline engine starters for diesel engines, electric light plants, magnet generators, etc., should be considered and included with costs for fuel and lubricating oil. Estimates vary as to costs of starting fuel but it is common practice to use one cent per hour of machine operation. This is high for actual fuel used in the starting engine but it is generally recognized that not all of this fuel is consumed in the starting engine.

A common practice for starting fuel and light plant fuel is to allow 5 cents per hour of machine operation. Fuel consumption for magnetic generators should be based on horsepower developed.

**Lubricating Oil** is considered with fuel, as it varies with the size and type of engine. It usually includes a complete change every 100 hours plus make-up oil between changes.

A formula used to estimate lubricating oil consumption for this type of equipment is:

$$G.P.H. = \frac{\text{h.p.} \times .6 \times 0.006 \text{ to } 0.007 \text{ per h.p. hr.}}{7.4 \text{ lbs. per gal.}} +$$

Gals. capacity of crankcase

100 hours between complete changes

An engine factor of 60% is used. The figure 0.006 is used for engine under 100 hp and 0.007 for engine over 100 hp.

There is a trend to increase the number of hours between complete crankcase oil change. Formerly 70 hours was used, now 100 hours is more common and some advocate 200 hours. The practice of the user must be determined in making this estimate.

It is necessary to know the capacity of the crankcase of the particular engine in use in order to accurately estimate total lubricating oil consumption. A very rough rule of thumb in determining the crankcase capacity for diesel

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## Hourly Operating Cost—shovels and hoes (2 to 2½ yd.)

(Economic Life: 8 years or 16,000 hours. Total cost or investment = 100%. Average investment = 56¼%).

	Cost in % of Total Cost Per Year	Per Hour
1. Depreciation.....	12.5 %	.00625%
2. Interest, taxes, insurance, storage, etc. (10% of average investment).....	5.625%	.00281%
3. Repairs, maintenance & supplies.....	12.5 %	.00625%
Shovels & hoes = 100% of total cost over life of machine.		
<b>Total Fixed Cost.....</b>	<b>30.625%</b>	<b>.01531%</b>

Add cost of engine fuel, lubricating oil, labor (operating crew)

## Hourly Operating Cost—draglines, clamshells (2 to 2½ yd.) cranes (20 tons and over).

(Economic Life: 12 years or 24,000 hours. Total cost or investment = 100%. Average investment = 54.2%).

	Cost in % of Total Cost Per Year	Per Hour
1. Depreciation.....	8.33%	.00416%
2. Interest, taxes, insurance, etc. (10% of average investment).....	5.41%	.00271%
(1) + (2).....	13.75%	.00687%
3. Repairs, maintenance, supplies.....		
(a) Clamshell & dragline = 80% of total over life of machine.....	6.66%	.00333%
(b) Crane = 60% of total over life of machine.....	5.00%	.00250%
<b>Total Fixed Costs</b>		
(1) + (2) + (3).....		
(a) Clamshell & dragline.....	20.4 %	.01029%
(b) Cranes.....	18.75%	.00937%

Add cost of engine fuel, lubricating oil, labor (operating crew)

Proposed Machine 3/4 cu. yd. Shovel - with light plant (Diesel Engine) - 70 H.P. Crankcase 4 gals. - Single Shift - 2000 Rev./hr.

Price and Weight f.o.b. Works	40000 lbs.	\$ 20000.
Blocking	1000 lbs.	
Additional Equipment (Buckets, light plant, etc.)	600 lbs.	\$ 600.
Freight @ \$1.25 cwt.	41600 lbs.	\$ 520.
Unloading & Moving to Job		\$ 75.
Item No. 1 Total Cost or Investment—100%		\$ 21195. Say \$ 21,200 (round fig.)
Economic life 8 years 10000 hours		
Item No. 2 Average Investment 60 % of Item No. 1 = \$		12720

	Cost	
	Per Year	Per Hour
Item No. 3 Depreciation 20 % of Item No. 1 per year.	\$ 4,240	\$ 2.12
Item No. 4 Interest, Taxes, Insurance 10% of Item No. 2 per year.	\$ 1,272	\$ 0.636
Item No. 5 Repairs, Maintenance, Supplies		
* (a) Shovels & Hoers = 100% of Item No. 1 over life of machine.	\$ 4,240	\$ 2.12
* (b) Dragline, Clamshells = 80% of Item No. 1 over life of machine.		
* (c) Cranes 60% of Item No. 1 over life of machine.		
Item No. 6 Total Fixed Costs—(Item 3, 4, and 5—a, b, or c)	\$ 9,752	\$ 4.876
Item No. 7 Engine Fuel and Lubrication Oil		
Fuel per hour 3 gals. @ .15¢	\$ 0.45	
Auxiliary fuel per hour gals. @	\$ 0.05	
Lubrication oil per hour .09 gals. @ 1.00	\$ 0.09	
Per Hour	\$ 0.59	\$ 0.59
Item No. 8 Direct Labor—Operating Crew		
1 Operator \$ 1.50 per hour		
1 Oiler \$ 1.00 per hour		
0 Pitmen \$ per hour		
10% 1/2 \$ 0.25 per hour		
Total \$ 2.75 per hour		
1/4 Add for overtime, O.A.B., Insurance, etc.	\$ 5.500	\$ 2.75
Item No. 9 Total Direct Costs—(Items 6, 7, and 8)	\$ 16,432	\$ 8.2164
Item No. 10 Indirect Costs (Supervision, Overhead, etc.)	\$	\$
Item No. 11 (Items 9, and 10) Total Costs	\$	\$

\*On a combination machine use a, b, or c, for the combination to receive the most service or on average for overall use.

\*\* 800 cu. yds. per hr. = \$0.0913 per yd.

★ Estimating form published by the Power Crane and Shovel Association for use with technical bulletin No. 2

engines in this range is .05 to .07 gals. per horsepower; gasoline engines about .04 gals. per hp.

Example: Lubricating oil consumption for 150-hp engine with 5 gal. capacity crankcase would be:

Formula

$$\text{G.P.H.} = \frac{150 \times .60 \times .007 \times 1}{7.4} + \frac{5}{100} \text{ Gals. per hour} = .085 + .05 = .135$$

Operating Crew Labor: The price paid labor as well as the number in the operating crew varies in different



★ Estimating form published by the Power Crane and Shovel Association for use with technical bulletin No. 2

parts of the U.S. to such an extent that no attempt is being made to give such costs. This cost is also one of the most readily estimated. Some costs relating to crew cost besides rates of pay are Federal Old Age Insurance, Workmen's Compensation Insurance, Overtime, Paid Holidays, etc.

**Other Costs:** There are numerous other costs that enter into doing business for a profit with this class of equipment. A few of these are as follows: supervision; overhead or indirect; insurance; contingencies; moving from job to job or on the job; weather; local office; taxes. No attempt is being made here to cover these items as they are common to most business undertakings.

## South Carolina's Fastest Highway Earth Moving Job

*348,000 cu. yd. moved in 20 working days; 1,100,000 cu. yd. earthmoving part of road project completed in 25% of specified time limit for job*

**L & C Construction Company** of Columbia, S. C., a combine of two contracting firms, set a new record for highway earthmoving in their state last winter. Working on a 10.8-mile dual highway job on Route 1 between Aiken, S. C., and Augusta, Ga., this joint outfit took advantage of good December weather and moved 348,000 cu. yd. of excavation in 20 working days from Dec. 17 to Jan. 16. The entire 1,139,000 yd. of unclassified material took less than twelve weeks, or only about 25% of the working time specified for the project. Overhaul of 500,000 station-yards was involved.

The contractors under the L & C banner were the Robert Lee Construction Company of Manning, S. C., and Cherokee, Inc., of Columbia, S. C.

The earthmoving outfit included 8

Wooldridge Terracobras (17-yd.); 4 Allis-Chalmers HD-19 tractors (2 or 3 on pusher service); 1 Euclid loader drawn by an HD-19; 12 Euclid bottom-dump wagons; 2 Gar Wood scrapers, one with an HD-19 and one with an HD-14 A-C tractor; 1 Caterpillar D8 with LeTourneau scraper; 1 D7 with dozer; 1 HD-14 with dozer; 1 Galion, 1 Adams and 2 Caterpillar graders.

A LaPlant-Choate TS300, 1 C-11

Tournapull, 8 bottom-dump Euclid trucks, 1 Bucyrus-Erie dragline; a Cietrac FDE tractor and 2 Case tractors were also on the work, some of this equipment being used for clearing.

The contract which covered clearing, grubbing and drainage as well as grading also included 28,000 cu. yd. of selected shoulder material, 1,236 cu. yd. Class A concrete for structures, and 11,000 l.f. of concrete drain tile

Proposed Machine 2 1/2 cu. yd. Shovel - Diesel Power - Gasoline Light Plant  
200 H.P. Engine with 10 gal. crankcase - 1000 hrs. per year.

Price and Weight f.o.b. Works	158000 lbs.	\$ 62000.
Blacking	2000 lbs.	
Additional Equipment (Buckets, light plant, etc.)	1000 lbs.	\$ 1000.
Freight @ \$1.25	cwt. 161000 lbs.	\$ 2015.
Unloading & Moving to Job		\$ 100.
Item No. 1 Total Cost or Investment—100%		\$ 65115. Say \$ 65000 (round fig.)
Economic life 8 years 16000 hours		
Item No. 2 Average Investment 56.25 % of Item No. 1 =		\$ 36563

	Per Year	Per Hour
Item No. 3 Depreciation 12.5 % of Item No. 1 per year.	\$ 8125.	\$ 4.063
Item No. 4 Interest, Taxes, Insurance 10% of Item No. 2 per year.	\$ 3656.	\$ 1.828
Item No. 5 Repairs, Maintenance, Supplies		
*(a) Shovels & Hoes = 100% of Item No. 1 over life of machine.	\$ 8125.	\$ 4.063
*(b) Dragline, Clamshells = 80% of Item No. 1 over life of machine.	\$	\$
*(c) Cranes 60% of Item No. 1 over life of machine.	\$	\$
Item No. 6 Total Fixed Costs—(Item 3, 4, and 5—a, b, or c)	\$ 19906.	\$ 9.954
Item No. 7 Engine Fuel and Lubrication Oil		
Fuel per hour 8 gals. @ 15¢	\$ 1.20	
Auxiliary fuel per hour gals. @	\$ .05	
Lubrication oil per hour .213 gals. @ 1.00	\$ .21	
Per Hour	\$ 1.46	\$ 2.920

Item No. 8 Direct Labor—Operating Crew		
1 Operators \$ 2.00 per hour		
1 Oiler \$ 1.50 per hour		
1 Pitmen \$ 1.00 per hour		
10% 1/2 \$ .45 per hour		
Total \$ 4.95 per hour		
1/4 Add for overtime, O.A.B., Insurance, etc.	\$ 10000.	\$ 5.00

Item No. 9 Total Direct Costs—(Items 6, 7, and 8)	\$ 32842.	\$ 16.42**
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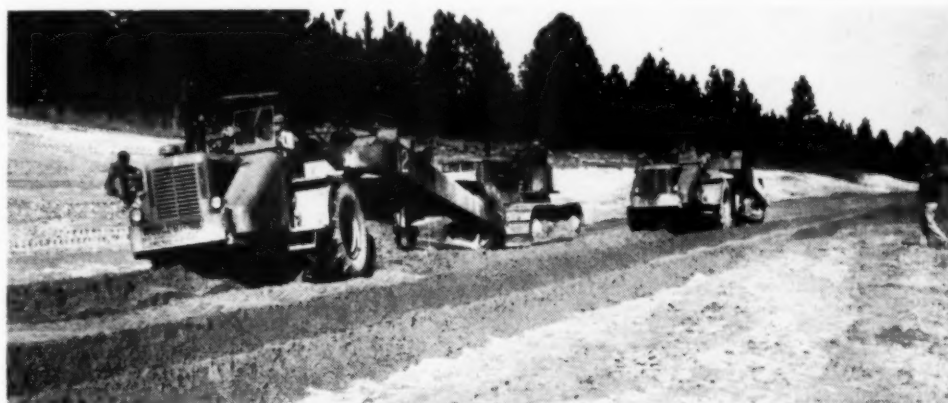
Item No. 10 Indirect Costs (Supervision, Overhead, etc.)	\$	\$
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Item No. 11 (Items 9, and 10) Total Costs	\$	\$
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\*On a combination machine use a, b, or c, for the combination to receive the most service or an average for overall use.

\*\* \$200 yds. per hr. = \$.082 per yd.  
\$250 yds. per hr. = \$.066 per yd.  
\$300 yds. per hr. = \$.055 per yd.

★ How a highway grading job looks from the air. The S. Carolina Route 1 project, seen well along, with break for culvert work



★ Fleet of Terracobras on the L & C South Carolina job

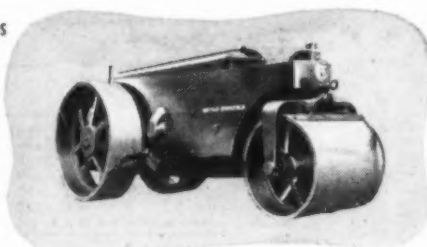
★ HD-19 Allis-Chalmers tractor-drawn Euclid loader on the L & C job

# Buffalo-Springfield Rollers

## FOR A BETTER JOB AT LOWER COST!

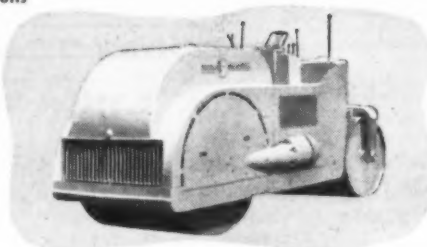
### 3-WHEEL Sizes: 5 to 14 tons

Buffalo-Springfield 3-Wheel rollers with all welded box frames and heavy steel side plating have the extra strength for long hours of continuous low cost operation.



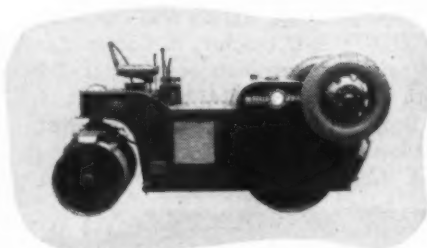
### TANDEM Sizes: 1 1/2 to 21 tons

All Buffalo-Springfield Tandems have the final drive on the side opposite the operator giving maximum operator vision. Bevel gear final drive reduces roller overhang. Result: Closer rolling, with fewer passes and lower job costs.



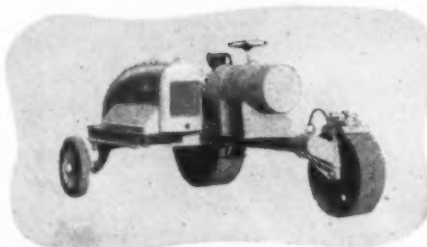
### PORTABLE

A simple towing attachment and easily installed road wheels give this roller maximum portability. Quickly towed from job to job, the KT7, with 3 to 4 ton capacity, will handle all your small jobs economically. Ideal for "patch work."



### TRENCH

Specially designed for rolling trenches and equipped with hydraulic leveling device, the Buffalo-Springfield Trench Roller cuts rolling time on widening jobs.



★ Trucks and dragline work were necessary for culvert excavation, miscellaneous clearing, clean-up, etc.

and culvert pipe. Fifty-five buildings were moved from the right-of-way as a contract item.

Deepest cut was 35 ft., with several cuts of 28 ft. or deeper. The largest cut had 51,000 cu. yd. Fills were of less depth in general but covered more area, the largest being 68,000 yd. The speed of the work is ascribed to a combination of favorable conditions, plus alert management. The weather was open and the sandy soil such that equipment was able to operate 22 days between Dec. 16 and Jan. 16, despite time off for holidays. The outfit worked 22 days from Jan. 16 to Feb. 16. Days were 10 hours, which meant from dawn to dusk, practically.

The sandy clay gravel soil, with some marl wasn't too difficult to move, and no compaction other than that obtained by the equipment was required. Shrinkage was estimated at 10%, but actually ran nearer 20%, indicating considerable consolation.

The main factors in the contractors' showing were two in number, observers stated. President R. B. Hawthorne of Cherokee, Inc., lived on the job in a trailer and hence was able to give the project quite the reverse of absentee management. And there was "a lot of modern equipment." Over \$400,000 worth of machinery is represented by the equipment list given. The average haul was fairly short, with short balance areas of cut and fill. The contractor followed the usual procedure of first getting culvert work done with all possible dispatch, while the heavy clearing work was in progress. Then heavy dozers and tractor-drawn scrapers began skinning down the edges of cut areas and placing material in the lower lifts across rough bottom land. With haul conditions thus made better the self-propelled scrapers handled the rest of the material in some places, and the loader and wagons served where haul was longest.

J. C. Asbill was resident engineer on the project for the state of South Carolina, S. N. Pearman, state highway engineer.

R. B. Hawthorne was superintendent; other contractor field personnel included B. A. Barney, J. M. Gordon and Jack Young of Cherokee, Inc.



## ARBA-AASHO Joint Committee Formed

Appointment of a cooperating committee for joint study of matters of mutual interest is announced by the American Road Builders' Association and the American Association of State Highway Officials. With increased efficiency in the highway industry and profession as its objective, the joint committee is expected to initiate a series of meetings and study projects at an early date.

Colonel E. R. Needles, ARBA president, has named the following men to the ARBA committee: Hal G. Sours, consulting engineer of Columbus, Ohio, chairman; Alan Buck, Macon county superintendent of highways, Decatur, Ill., and president of the ARBA County Highway Officials' division; Joseph D. Bonness, Milwaukee, Wis., contractor and vice-president of the ARBA Highway Contractors' Division; A. B. Gay, Richmond, Va., contractor; Julien R. Steelman, vice-president, Koehring Co., Milwaukee, Wis., and H. H. Kranz, city engineer of Cincinnati, Ohio, president of the ARBA municipal division.

Members of the AASHO committee, as announced by President C. W. Brown, are: C. M. Hathway, Illinois, chairman; G. T. McCoy, California; J. A. Anderson, Virginia; G. A. Hill, Connecticut; E. L. Roettiger, Wisconsin, and A. C. Clark, Bureau of Public Roads, Washington, D. C.

## Gasoline Tax Increases

Gasoline tax rates have been increased by the legislatures of 15 states this year, and three others have made temporary tax increases permanent, according to the Federation of Tax Administrators.

The increases were:

Two-cent increase—Missouri, New Mexico and North Dakota.

One and one-half-cent increase—Washington.

One-cent increase—Delaware, Kansas, Minnesota, Montana, Nebraska, North Carolina, Oklahoma, Oregon and Pennsylvania.

One-half cent increase—Nevada and Vermont.

Idaho, Maine and West Virginia made permanent tax increases enacted in 1947 and scheduled to expire this year.

Twenty-four states have raised gasoline tax rates since the end of the war. The higher revenues will be used primarily to finance construction and improvement of state road systems.

The higher tax rates have not reduced gasoline use, says the Federation.

## A RADICAL NEW DEVELOPMENT in woven tapes



## PHOENIX WYTEFACE Non-metallic Woven Tapes

Trade Mark

U. S. Pat. 2,321,920

**OVER 3 TIMES LONGER WEAR.** An enormous stride. A radical development. The new *non-metallic* PHOENIX WYTEFACE, as one highway engineer puts it, "has at least three times the life of ordinary metallic tapes". Drastic field tests—in extremes of climate, in water and mud, over stones and rocks, under truck wheels, through brush and barbed wire—have established that fact. Here is the reason. PHOENIX WYTEFACE is a weave of amazingly strong synthetic yarns—a scientific wartime development—completely covered and protected by a special tough plastic coating that is not affected by water, is not brittle and will not flake.

**MORE ACCURATE.** PHOENIX WYTEFACE will stand up to repeated soaking and drying and still maintain a dimensional stability substantially higher than that of ordinary so-called "metallic" tapes.

**HIGHER DIELECTRIC CONSTANT.** PHOENIX WYTEFACE Woven Tapes are entirely *non-metallic*—a feature that is important to Power and Utility Companies and to anyone working near high tension circuits.

**EASY TO READ AND CLEAN.** The clear black and red markings on the white background are easy to read. The surface is easily wiped clean.

Ask your K&E Distributor or any K&E Branch to show you the new PHOENIX WYTEFACE *non-metallic* Woven Tape, or write on your letterhead for a sample length to Keuffel & Esser Co., Hoboken, N. J.

## KEUFFEL & ESSER CO.

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# Uniform Lighting for Snow Removal Equipment

**R**ECOMMENDATIONS for uniform lighting of snow plows and other snow equipment were recently adopted as policy by the American Association of State Highway Officials. Entitled "Standard Uniform Method of Lighting Snow Removal Equipment," this statement represents the following committee action:

The Highway Research Board committee on snow and ice control made a study and submitted recommendations to the AASHO's committee on maintenance and equipment. This latter committee, consisting mostly of state highway maintenance chiefs and equipment engineers, approved the recommendations, and submitted them to the National Committee on Uniform Traffic Laws and Ordinances, which gave their approval on Jan. 3, 1949. The AASHO adoption as policy followed after studying results of a letter ballot which closed June 25.

Details of the lighting recommended are as follows:

I. Identification lights should be provided on all snow and ice control equipment. These lights or light should be—

- A. Located on the cab,
- B. Visible from all directions,
- C. The light should be flashing,
- D. Blue in color, with
- E. Minimum diameter of lens—6 in., and having
- F. A minimum light intensity of from 21 to 32 candle power.

II. Clearance lights should be provided on snow and ice control equipment. One light should be—

- A. Mounted on left side of cab,
- B. Adjustable to extreme width of plowing equipment.
- C. A clearance light should also be placed on the right side of cab when plowing wings are not used.
- D. When wings are used, flood lights should be provided to illuminate the plowing wing.
- E. Color of clearance light from front should be amber and from rear, red.
- F. Minimum dimension of light not less than 2 inches.
- G. Candle power to be of ordinary taillight intensity.

III. Other lights to be provided as required—

- A. Truck headlights to be raised above normal lights to clear

operating equipment. Auxiliary headlights to be used if necessary.

B. Additional operating lights may be located on top of cab or at other locations to illuminate plowing, abrasive spreading or other equipment if necessary.

## J. S. Bright Retires

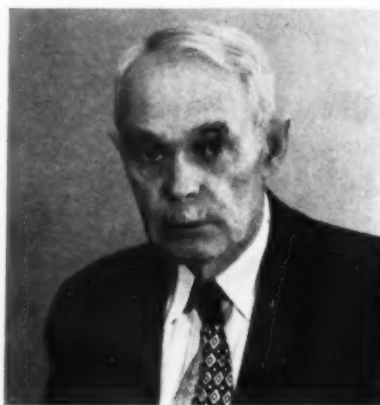
J. S. Bright, Deputy Commissioner of the Bureau of Public Roads, retired Aug. 31 after 32 years of service with Public Roads.

A native of California, Mr. Bright graduated from the University of California in civil engineering in 1901.

He served as assistant city engineer at San Bernardino, as chief engineer for the Fontana Land and Water Company in Rialto, California, as county surveyor for San Bernardino County, as chief engineer for the San Bernardino County Highway Commission, and as consulting engineer for a road-paving program in Tulare County. In 1917 he joined the Bureau of Public Roads (known then as the Office of Public Roads and Rural Engineering, Department of Agriculture).

Mr. Bright has been associated with Public Roads throughout the period that covered the development of the Federal-aid system of primary roads to its present stage. He served as senior highway engineer in the regional offices in Portland, Ore., and Missoula, Mont., from 1917 until 1919, when he was appointed district engineer in charge of all Federal-aid road work and Federal construction in national forests in several states.

In 1922 he was transferred to the



J. S. Bright

Western Headquarters office of Public Roads in San Francisco as chief construction engineer. In 1924, when Federal-aid was extended to Hawaii, he was sent to Honolulu, where he organized the Public Roads office and initiated the planning and construction of the road system which today is an important factor in the defense of the islands. He was appointed deputy commissioner of Public Roads in 1944, with headquarters in Washington, D. C., and since that time has been in charge of construction and maintenance operations of Public Roads.

Before his appointment as deputy commissioner, Mr. Bright supervised the largest highway job ever undertaken—construction of the Alaska Highway. In April, 1942, he was made district engineer in charge of civilian forces building the highway. He was directed to organize the forces of a large number of contractors, transport men and equipment to the northern wilderness, and locate and construct the 1,420 miles of highway from Dawson Creek to Big Delta in two short construction seasons.

Under the plan adopted, Army engineer forces pushed through a pioneer road and civilian forces followed closely behind, constructing an all-weather truck route. At the peak of activity in 1943, the 81 contractors on the project employed 14,000 workers and used 6,000 heavy units of equipment.

## Highway Death Rate Lowest Recorded

The nation's traffic death rate during the first half of 1949 was the lowest ever recorded, according to figures prepared by the National Safety Council. The rate was 7.0 per 100 million miles of travel, compared with the previous low of 7.2 for the first five months of 1948.

## Cost Analyst Appointed for Virginia Highway Department

A new position of Cost Account Analyst has been established in the headquarters office of the Virginia Department of Highways at Richmond. The position will be filled by H. M. Morecock, who has been with the department since 1929, and is widely experienced in construction field work. The purpose of the new department will be to study data developed in the new cost accounting system, with the purpose of achieving economies in road construction and maintenance.

# KNOCKIN' Out the Yardage

## Highlights of Bituminous Resurfacing Job in California

By W. E. Bertken,

Resident Engineer, California Division of  
Highways, Bakersfield, Calif.

**A** FAST pace of 142 tons per hour for dense graded hot-mix and 102 tons per hour for open-graded mix is reported for a resurfacing contract in Southern California. Dicco, Incorporated, and Dix-Syl Construction Company, Inc., of Bakersfield, had the job, which consisted of portions of U.S. 99 and 399. U.S. 99 work included 19.1 miles beginning south of Bakersfield and running up past Wheeler Ridge nearly to Grapevine, along the famous long grade leading out of the Valley. U.S. 399 work included 10.7 miles of route immediately off of U.S. 99.

U.S. 99 through the job is a divided highway consisting of two 26-ft. roadways of asphaltic concrete with 6-ft. plant-mixed borders on the north-bound lanes; and 23 ft. of asphaltic surfacing with 3-ft. plant-mixed borders left and right and a 5-ft. road-mixed shoulder right on the south-bound lanes.

The work done on U.S. Route 99 consisted of resurfacing the driving lanes and borders with 1/2-in.-max. dense-graded plant-mixed surfacing. A wearing course consisting of 0.06 ft. thickness of open-graded plant-mixed material was placed over the dense graded surfacing on the central 22 and 23 ft. of the n.b. and s.b. lanes, respectively.

The grading of the mineral aggregate for the open-graded mix conformed to the following sizes and limits:

Sieve Size	Percentage Passing
3/4" "	100
1 1/4" "	90-100
3/8" "	65-85
No. 4	20-40
No. 16	0-12
No. 200	0-3

Paving asphalt (85-100) was used as asphaltic binder in both the dense graded and open-graded mixes.

The existing U.S. 399 pavement

consisted of 18-ft. wide x 5 in. thick asphaltic concrete or plant-mix over 5-in. p.c. concrete, with oil mix shoulders 2 to 6 ft. wide. The work done consisted of resurfacing a 22-ft. width with 1/4-in.-max. dense-graded plant-mixed surfacing. Liquid asphalt SC-6

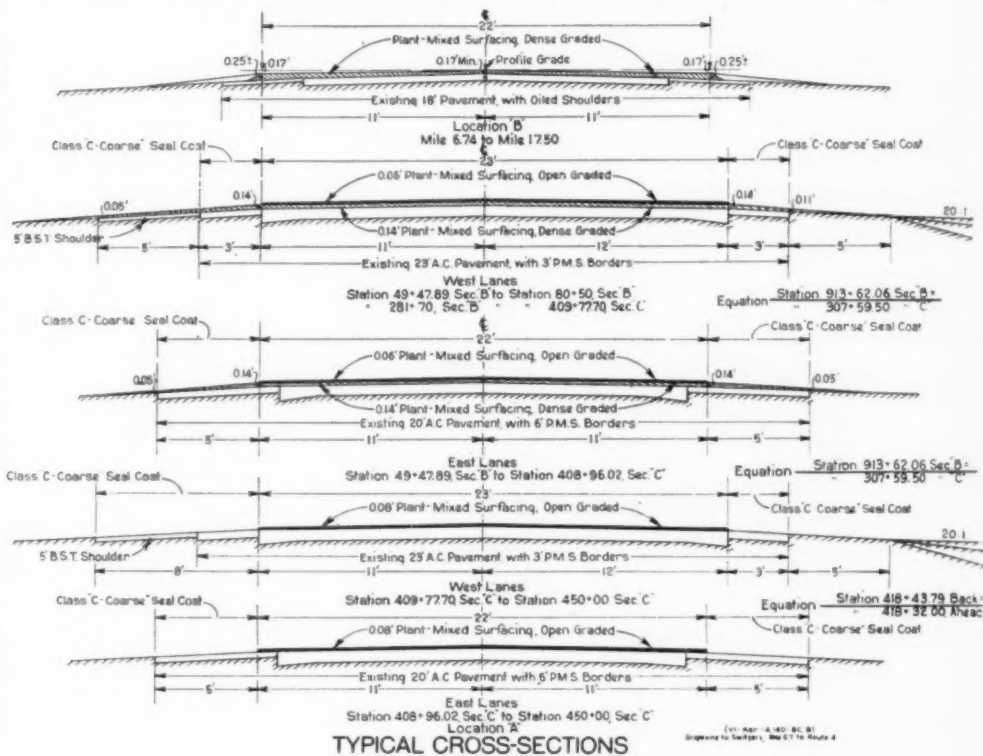
Pictures and notes from jobs on which contractors are making excellent time with the help of up-to-date equipment and methods

was used as asphalt binder.

Building up the earth shoulders to meet the new surfacing was performed by state maintenance forces.

### Aggregate Production Methods

The mineral aggregate for the plant-mixed surfacing was obtained from a deposit located approximately 1/4 of a mile west of U.S. Route 99, near Wheeler Ridge. The material, consisting of sand, gravel and boulders up to 12-in. size, was processed by a Cedar Rapids Master Tandem portable rock plant and stockpiled in two sizes, 3/4 to 3/8 in. and 3/8 in. to dust. A 10-ft. diameter tunnel 150 ft. long, made with corrugated metal pipe, was



★ Layout of aggregate processing plant, which included Cedar Rapids Master tandem portable crushing and screening unit







★ Standard 4,000-lb. asphalt plant operating on the US 99 and 399 project

used for feeding the plant, which was powered by a D17000 Caterpillar diesel engine.

The rock pit consisted of a bank deposit located 20 to 28 ft. above the level of the plant setup. Because of this, it was convenient to feed the plant by bulldozer. A D7 Caterpillar tractor and an HD-10 Allis Chalmers tractor were used for this operation.

The mixing plant was a 4000-lb. Standard batch plant, equipped with Simmons vibratory screens.

Due to the shortage of electrical power in the San Joaquin Valley at the time of the installation of the mixing plant, it was necessary to provide for powering the plant by engines. The mixer, hot elevator and vibratory screens were powered by a D17000 Caterpillar diesel engine. The drier and dust collector were each powered by model 671 GMC diesel engines. The conveyor belt from the feed tunnel to the drier was powered by a Chevrolet engine.

The asphalt cement used as binder in the plant-mixed surfacing was stored in two 7,000-gal. tanks and one 10,000-gal. tank. The asphalt was pumped from tanks to weigh hopper by a steam asphalt pump.

Fuel oil for firing the boiler and drier was stored in a 7000-gal. tank. A steam asphalt pump supplied the fuel oil to a 125-hp. boiler. A weighing platform, including Howe platform scales of 48,000-lb. capacity, was installed about 300 ft. from the mixing plant.

Most of the plant-mix was hauled to the job in V-8 Ford trucks with Cook dump bodies and Cook drives. The haul road consisted of a natural, hard, gravel surface and required very little maintenance.

#### Mix Placement Methods

The plant-mixed surfacing was placed in two courses. The first course or leveling course was spread by a 9-ft.-wide pneumatic-tired spreader box, and bladed to cross section by a No. 12 Caterpillar grader. The second course was spread and finished by a Barber-Greene finishing machine. An 8-ton tandem and a 12-ton 3-axle tandem Buffalo-Springfield roller were used for the compaction of both courses.

Principal quantities and prices:

#### (U.S. Route 99)

Min. aggr. (dense graded)	53,600 t.	@	\$ 2.63
Min. aggr. (open graded)	19,700 t.	@	\$ 2.81
Paving asphalt (85-100 pen.)	3,440 t.	@	\$20.60

#### (U.S. Route 399)

Min. aggr. (dense graded)	20,800 t.	@	\$ 3.31
Liquid asphalt (SC-6)	905 t.	@	\$20.60

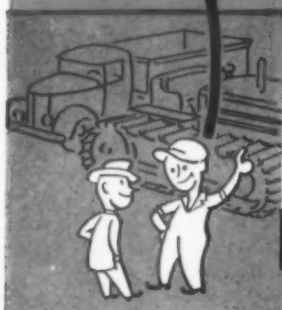


JOE SAYS IT'S LIKE RIDING ON A CLOUD  
SINCE WE INSTALLED VELVETOUCH ALL-METAL  
CLUTCH FACINGS AND BRAKE LININGS



You'll note the difference, too . . . in smoother operation that cuts fatigue and engine wear. In more dependable starts and stops. And in extra service between tear-downs. Because Velvetouch all-metal clutch facings and brake linings are heavy-duty built to give you longer wear, more uniform performance. They can't rot in oil . . . are not affected by moisture. They run cooler . . . install easier . . . and actually cost less on the basis of work done. Specify genuine Velvetouch on your next order . . . and get the operating advantages found only in all-metal construction.

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ORIGINAL EQUIPMENT  
... WITH THE LEADERS



## Ease Up On Balancing Cut And Fill

(From "Highway Extension News," issued by the School of Civil Engineering and Technical Extension Division, Purdue University, Lafayette, Indiana; Ben H. Petty, Editor)

The brightest star of all is added to the Road Designer's crown when finally he has acquired the knack of laying a grade line on a proposed highway profile that will provide just enough excavation to make the required embankment within a reasonable hauling distance. Of course, this must make allowance for the "exact" percentage of shrinkage from cut to fill. From then on, he is known among his jealous coworkers as "Horatio Alger," and his salary may be increased a maximum of \$5.00 a month!

In rough terrain this "balancing" goal usually is highly desirable. But this humble writer thinks we have seriously overdone it in the flatter topography to be found in many states.

After a heavy rainfall, as my 10-year-old Plymouth plows through the one- to six-inch sheets of water frequently encountered on these low level highways, and I can dimly make out through the spray the outlines of a superduper freight truck bearing down on me from the opposite direction, my silent supplication invariably is, "My kingdom for a Mississippi River Pilot!" After emerging from the shower bath and thinking of the many Horatio Algers, my first question is, "Whodunit?"

Some of this water business can be charged to the failure of the Maintenance Department to remove high shoulders and provide adequate side ditches. But primarily the low-level grade line is at fault.

If cross-sections were taken at 100-ft. intervals over 100 miles of state highways picked at random in the flatter terrain areas, I will wager my battered old felt hat against a Soviet ruble that a surprising percentage of these cross-sections would reveal that the surface of the pavement is lower than the ground surfaces at the R/W lines. (Pause of breath!)


In far too many cases the road cross-section is concave rather than convex. The road is upside down! No wonder we have drainage and snow removal problems! In areas of granular subgrades and low annual precipitation, low level grade lines may be of little significance, but elsewhere they cause many headaches.

CHOOSE

# "QUICK-WAYS"

REG. U. S. PAT. OFF.

## FOR SURE PROFITS!



YOU CAN BUY A  
"QUICK-WAY"  
TRUCK CRANE  
For as low as  
**\$6,775.00**  
complete with chassis  
F.O.B. Factory  
Write for full details

In all power shovel applications, capacity and utility are essentials. A truck shovel must have high speed mobility, be immediately convertible and have adequate capacity to be economical on every job. A "QUICK-WAY" has all these fundamentals plus a long list of others.

"QUICK-WAYS" are designed for full truck speed, on or off the highway. Mounted on any standard truck, the working parts provide perfect operating balance for the truck shovel. All-steel construction gives built-in strength and lightness for maximum capacity and stability.

You get more utility out of a "QUICK-WAY" fully equipped than any comparable equipment. Each "QUICK-WAY" is easily converted in minutes from Shovel to Crane, Dragline, Clamshell, Pile Driver, Scoop, Trench-Hoe, Backfiller, etc. Buy only the attachments you want; your "QUICK-WAY" does more jobs better.

Parts are rugged and simple, requiring a minimum of servicing and having proved ability to take a life long beating. Many interchangeable parts and easy accessibility simplify maintenance and repair. From engine to attachment, every "QUICK-WAY" part will deliver its capacity rating and more.

The essentials built into every "QUICK-WAY" mean sure profits on a small investment; economical to buy, economical to use, it's one of the most useful machines you can own. There's a "QUICK-WAY" owner near you; ask Him.



MODEL E: 4/10 cu. yd. cap., mounts on any standard 5-ton truck.

MODEL J: 1/4 cu. yd. cap., mounts on any standard 1 1/2-ton truck.

**"QUICK-WAY"**  
TRUCK SHOVEL CO., Denver, Colo.  
WORLDWIDE DISTRIBUTOR SALES AND SERVICE

PIONEER IN POWER SHOVELS FOR TRUCK MOUNTING AND STILL THE LEADER

**For Safety Sake**

# DIETZ HIGHWAY TORCHES

**Throw Light on Darkness  
Where Danger Lurks --**



## FAULTLESS IN ANY WEATHER

The bright clear light of a DIETZ HIGHWAY TORCH actually waves the warning: "DANGER-BEWARE."

DIETZ HIGHWAY TORCHES are nationally accepted as the standard, due to their ability to stand up. They are leak proof, rain proof, and wind proof. No. 87 with weighted bottom (illustrated) will burn about 30 hours without refilling and is popularly priced.

BY THE MAKERS OF



**R. E. DIETZ COMPANY, NEW YORK**

ESTABLISHED 1840

**OUTPUT SOLD EXCLUSIVELY THROUGH THE REGULAR JOBBING TRADE ONLY**

*The fourth of a series in the interest of more efficient use of steel...a vital American resource.*

## INHERENT STRENGTH



The actual inherent strength of rail steel is fully harnessed for work in the Laclede Multi-Rib bar design. Rail steel rolled into bars with Multi-Rib design offers a yield strength in excess of 55,000 PSI with greatly increased anchorage. Laclede Multi-Rib Reinforcing Bars meet the new ASTM Specification A 305-47T, which provides a long-needed yardstick for anchorage in reinforcing bars, assures a more efficient use of steel.



Modernize your specifications with ASTM A 305-47T  
Modernize your steel reinforcing with Laclede Multi-Rib Bars!

**LACLEDE STEEL COMPANY**

St. Louis, Mo.

My sideline opinion is that even if it requires 100% borrow in some localities to keep the grade line two or three feet above the surrounding ground, the cost would be greatly exceeded, from then on, by the benefits from better drainage, less snow removal, longer pavement life, lowered maintenance costs and less inconvenience to motorists. This assumes, of course, that the borrow is suitable embankment material. Yes, there will be occasional cuts where the surrounding ground surfaces necessarily will be above the pavement level, but adequate side drainage facilities can keep the pavement well above the water line in the subgrade.

Back in the horse and buggy days when roads were built by man- and team-power alone, excessive cut and borrow was pretty much out of the question. That is why so many of our county and township roads, built years ago, have an upside down cross-section. But since the coming of the efficient, economical, productive, mechanical earth-moving equipment there has been little excuse for this practice.

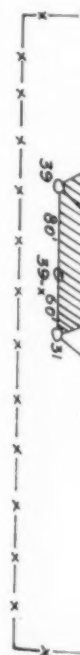
Don't let anyone kid you into believing that this "high level" grade line idea is something new. It was advocated over 125 years ago by one of the greatest engineers of all time, who devoted a share of his genius to road building, Thomas Telford of great Britain. The following quotation is from his Road Specifications: "A perfectly flat road is to be avoided, if it is not to be raised at least two or three feet above the general level of the land on each side of it, so as to expose the surface of it fully to the sun and wind, . . ."

For several years, many states have used the high level grade line where it was desirable. Others have been slow to catch on!

(Continued from page 52)

Highly qualified personnel is being concentrated on these projects so that their execution and technique will be the best available. R. L. Peyton, concrete research engineer in the Materials Department of the Highway Commission, will be in over-all charge of the research phases, while the actual construction details will be in charge of the resident engineers on the projects, who are R. E. Elliott for the Topeka project, and F. D. Wagner for the by-pass project on US-81. Progress reports will be published from time to time as the information develops and as any worthwhile results crystallize.

The Highway Commission personnel appreciates the cooperation shown by the Public Roads Administration and Portland Cement Association and the various commercial companies involved in making these projects a successful reality.



# Sampling and Testing

## Aggregate Plant Output in New Mexico

**E. B. Bail**

Materials Engineer, New Mexico State Highway Department, Albuquerque

**P**RACTICALLY all aggregate for base course and bituminous top in New Mexico has been produced from arroyo deposits. These arroyos are water channels which are dry 350 days per year. During the fifteen days when they do carry water they are the passageways for flash floods of considerable volume but short duration. Aggregate deposits left by these floods are heterogeneous in the extreme. Preliminary sampling requires close spacing of test holes. Fig. 1 shows the layout of the test hole spacing over a better than average deposit near Tucumcari in eastern New Mexico. Because of the danger to livestock, all but a few representative holes are backfilled. Holes left open for inspection by prospective bidders are tight-fenced.

A first-class portable crushing and screening plant, including a primary crusher with pan feed, and the necessary power units, will cost up to \$60,000. From the contractor's point of view a plant of this type, once it is in operation, must run to capacity to amortize the investment. Here the contractor and the highway department are of one mind. From the department's point of view, the sooner the job is done the sooner the facility

becomes available to the public. Thus the two parties to the contract are in complete agreement as to the desirability of large output.

### Excessive Fines a Problem

However, the department stipulates that the product of the contractor's plant must meet certain requirements as to gradation; beyond this requirement, the product must not contain sufficient clay or other plastic binder to raise its Plastic Index above 6. Typical New Mexico Specifications are shown below.

#### Ballast:

Passing 3"	—	100%
" No. 4	—	35-95
" No. 40	—	15-50
" No. 200	—	Not more than 20

#### Physical Properties:

	minus No. 40 sieve
L.L.	35 or less
P.I.	6 or less
Dust Ratio	65 or less

#### Leveling Course and Bituminous Top Course

Passing 1"	sq. opening	100%
" 3/4"	" "	55-100
" No. 4	" "	40-80
" No. 10	" "	30-60
" No. 40	" "	15-35
" No. 200	" "	5-15

#### Physical Properties:

	minus No. 40 sieve
L.L.	25 or less
P.I.	6 or less
Dust Ratio	65 or less

Along the eastern border of the state the top soil is underlain by tight to loose beds of calcium carbonates with varying amounts of clay. This

material is known as caliche. The type and composition often vary greatly in the same pit. Usually the top layer is harder and of better quality than the layers immediately below, and the thickness of this top layer is the determining factor as to whether a given deposit can be worked economically. The top layer runs from a thickness of 6 in. up to 6 ft., with 3 ft. of about the minimum for workability.

Since it is impractical to work this material without incorporating some of the soft layer in the crusher product, it is certain that rolling for compaction will produce more fines, so an attempt to limit the fines is incorporated in the following:

### Special Caliche Specification

Passing 1" sq. opening	100%
" No. 4	25-40
" No. 200	0-10

Variations from the above general and special gradations may be written to enable the use of a particular deposit in order to eliminate excessive waste.

### Mixing Always Required

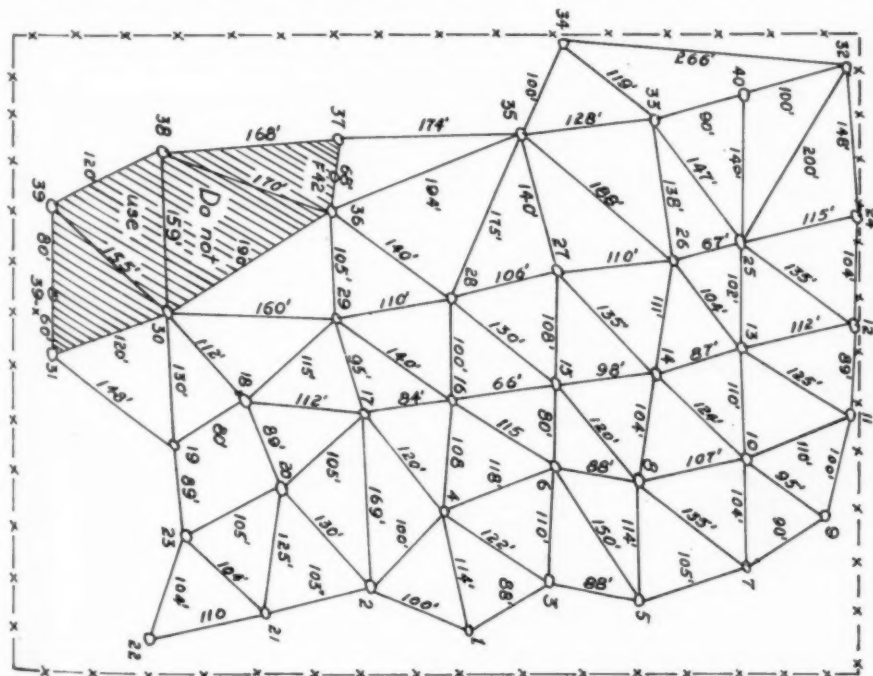
Without exception, New Mexico aggregate pits require manipulation; that is, mixing of coarse and fine areas. In many cases, as much as 30% to 40% of the materials passing the No. 4 screen must be wasted because of excess passing the No. 40, or because the fines are highly plastic and room must be made for the addition of non-plastic fines.

The foregoing presents a fair picture of what the contractor is up against when attempting to produce specification material from the average New Mexico gravel or caliche pit. The Materials Engineer, too, will recognize the problem presented as one taxing the ingenuity and resourcefulness of both engineer and contractor in order that the greatest possible output be attained consistent with specification requirements.

### Sampling is a Problem

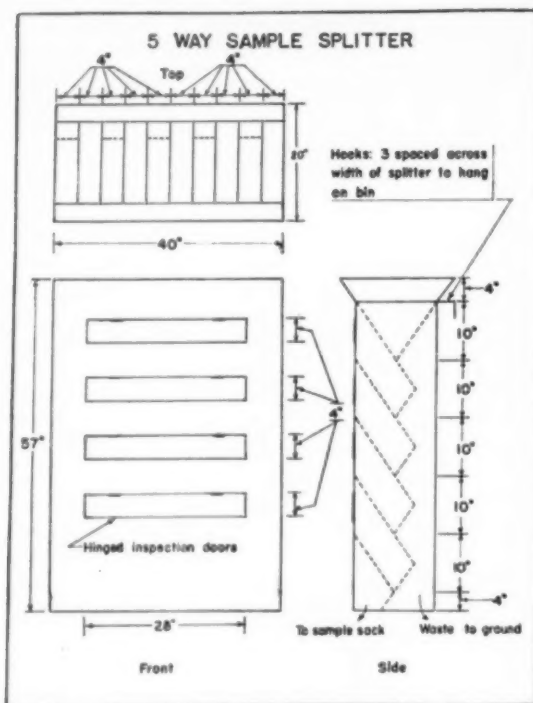
Without exception, New Mexico contractors deliver the sized product from

*Note: The author candidly discusses shortcomings in present aggregate sampling and testing, and suggests wet vibratory shaker test as means of shortening the period needed for checking gradation during crusher operation.*



★ Fig. 1—Layout of test holes for a typical gravel pit area





the final screen on a belt conveyor to the common jack-leg steel bin of 21-23 yd. capacity. The conveyor belt may vary in width from 18 in. for small plants to 30 in. for the largest. Capacity of the plants ranges from 200 tons per hour to 400 tons per hour for a large plant in fair running order.

It is the general practice of our field inspectors to sample at the discharge end of the conveyor. It has come to this writer's attention that some of our engineers have sampled by stopping the plant dead and then cutting samples across the stationary conveyor. This practice is an abomination, and invariably is protested by the crusher foreman and with reason. A tremendous strain is thrown on belts and driving gear when a plant is compelled to start fully loaded.

expect a man to work in that dust fog even with the dust "muzzles" we furnish them.

## That 30-Minute Lapse

If, by chance, the sample when tested passed the specifications, everybody draws a breath of relief. Engineer and contractor agree that that particular sample was a truly representative sample. This writer does not think it was. Material is pouring into the bin at the rate of 100 tons every 15 minutes; it is time for the inspector to go up the bin again and feel for another sample. They run it. This time it is out; it does not pass. By the time he has got the sample through the AASHO test 30 to 40 minutes have passed and the contractor has placed 200 to 300 tons of non-specification material on the road, often at the end of a 6-to-10-mile haul. Imagine his feelings when the

engineer tells him it's just too bad but he's got to do something about that last three hundred tons; it's too fine, too coarse, or some other damn thing the matter with it.

Now comes a lot of conversation, some of it unprintable. The contractor expresses his opinion of the so-and-so inspector. Where all was sweetness and light now all is black as pitch and sour as vinegar. The inspector contends that the sample was truly representative; the contractor says it was not. Again, this writer says it was not.

Now, how are you going to go about getting a representative sample? The place to go for an answer is to the men who produce copper ore by the thousands of tons per day. Or to any sizable mine producing low-grade ore. These mines would not, could not, operate without continuous sampling. They have numerous time-tested devices for doing this sampling. Just as the copper and gold producers were far beyond aggregate producers in the matter of crushing and screening equipment, so they are still far ahead of manufacturers of aggregate producers in the matter of knowing exactly what their product is.

Twenty-two years ago, this writer introduced the first vibratory screen into aggregate production in New Mexico. Faced with the necessity of furnishing a vast amount of surfacing material at a cost within the money available, he bought a little Leahy single-deck vibrating screen and placed it over a wooden bin furnished by a well-known manufacturer of crushing and screening equipment. This firm's engineers advised against placing the little vibrator on top of the wooden bin. Said it would shake it to pieces. It didn't. And it produced so much more material than the revolving screens then used by all New Mexico road contractors that there was simply no comparison. The writer predicted then (1927) that within ten years there would not be

a revolving screen in use. It took a little less than that.

### Frequent Small Samples

As a general statement, it can be said that a large number of small samples will be more truly representative of a mass of aggregate than a relatively few large ones. This principle was long ago recognized by ore dressers.

The writer has long been completely dissatisfied with our methods of sampling and testing. The sampling does not get representative samples and the testing takes too long.

Two or three years ago, the writer dug up a Power's catalog and picked out the addresses of several manufacturers of crushing and screening equipment. He wrote these people suggesting they equip their machines with some device for sampling their product. Some replied. The replies were generally from sales managers; they had a seller's market then and they didn't give a damn. Why improve your equipment when you couldn't make it fast enough to satisfy your market as it was?

The writer sent then a sketch of a sampler based on the splitting principle of the common laboratory Jones splitter. Fig. 2 shows how this splitter was made up. This device would cut 32:1 and was hung on the side of the bin.

Fig. 3 shows the method of catching the sample. In operation, two angles were placed across the bin. The sample catcher is a half-section of 8-in. pipe. It holds approximately 125 lb. and it fills almost instantly when the plant is putting out 400 t. per hr. A push-and-pull arrangement enables the inspector to stand on a foot board on the side of the bin away from the conveyor discharge,

thus keeping him out of the dust. In operation a sample can be taken every minute. We fixed a 5-minute interval. At a 32:1 split, a 125-lb. sample was cut to about four pounds. At the end of fifteen minutes we had a 12-lb. sample. This was split on a Jones splitter, giving us a 6-lb. sample for test. Thus we got twelve samples out of an hour's plant run, or a sample for every 33½ tons as compared with one sample for two hundred to three hundred tons by generally used methods.

This device did not work well. It was too sensitive to moisture. If the pit material was at all damp it would not split properly. According to Richards ("Text Book of Ore Dressing"), the width of opening should be four times the diameter of the largest particle in the sample. We had this width at the top but reduced the width at the second split to twice the size of the largest particle. Probably this error could be corrected by making the initial opening larger, but there was another draw-back; we could not see what was going on. So we tried another type.

### Another Scheme Tried

Fig. 4 shows the device we tried next. A laboratory man will recognize this get-up as a larger version of another W. S. Tyler Co. sample splitter. The device shown in Fig. 4 splits 16:1. It has the advantage of being open to view so that the inspector can see what is going on. It functions faithfully up to any moisture content at which the contractor's plant can screen properly. It is short enough to hang on the side of the jack-leg bin and yet allow the reject to be bypassed into the truck being loaded under the bin. This we were not able to do with the splitter shown in Fig. 2;

with this splitter the reject fell to the ground and it was necessary for the contractor to run a bulldozer around once in a while and push the reject back to the feed conveyor.

The device shown in Fig. 3 is still the only sampling device we have tried. It is not this writer's idea of a proper sampler. It works; and the stream of finished aggregate can be cut as often as a man can operate the push-pull. But it is a bear of a job to push and pull this catcher for eight hours at a stretch.

The sampling device should be automatic. It should start to operate as soon as the plant comes on to full load. It should cut the stream of finished aggregate at the foot of the finished feed belt conveyor. The cut should be taken by a small belt conveyor discharging on to a splitter which will cut 16:1 or, better, 32:1. After passing the splitter, the reject should be fed back to the stream by either belt or elevator.

Such a device would do away with the armed truce between engineer and contractor.

### "Post Mortem" Testing

The writer will begin by admitting that our testing methods are completely inadequate. Development of crushing and screening equipment is up-to-date as of 1949. Our testing procedure totters on the feeble legs of senility.

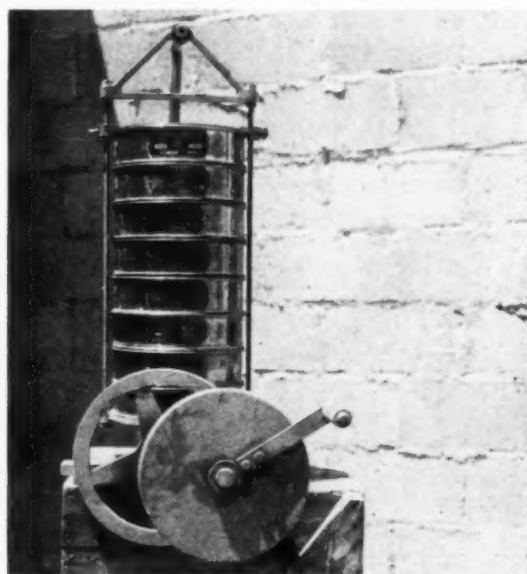
The AASHO and ASTM methods of test are in beautiful accord, specific in detail, meticulous in execution and so damn far behind the times in speed that every test result is merely a post mortem.

Since our specifications in New Mexico are based on AASHO standards, and since our methods of testing must conform to AASHO stand-

(Continued on page 85)



★ Fig. 4—A 16-to-1 splitting device which was tried, revealing advantages and disadvantages



★ Fig. 5—A type of "power" shaker used for separating burner-dried sample





★ An 8-yd. bucket at the moment of dumping mass concrete, using power trip

**Fully-automatic 220-yd.-per-hour batching and mixing plant specially designed for this project (See Aug. '48 R. & S. for details of aggregate production.) Articles to follow will describe aggregate hauling and the contractor's shops**

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★ Concrete mixing plant and cement silo specially designed for the Mt. Morris Dam project



# Concrete Production and Control

## at Mount Morris Dam

**C**ONCRETING operations at the Corps of Engineers' 900,000-cu.-yd. Mount Morris Dam project in upstate New York, are being expedited by a modern "push button" concrete plant specially designed for the project. This plant receives sand and stone (the latter in one to four sizes) from an equally modern aggregate plant. As described in last month's **ROADS AND STREETS**, the aggregate is notable for being an example of sand and stone 100% manufactured from a single quarry source. The material is limestone containing hard chert.

The concrete plant, located on one side of the gorge, was designed for this job by C. S. Johnson Company (Koehring). It embodies three 4-yd. Koehring tilting mixers, fed through a power-controlled 3-position swivel chute from a special bin assembly. Aggregate compartments of 100 to 150 tons capacity are clustered

around a central 400-bbl. cement compartment. The last word in fully automatic control, this plant includes a system of electrically actuated pneumatic controls governing bin gates, mixer intake, mixing drum timing and discharge and weighing of aggregates, cement, water and admixture. A compensator device, consisting of adjustable calibrated weights connected by wires to the tare controls on the weighbatcher, permits instantaneous adjustment of mix to allow for variations in sand moisture. A dust collector serves the enclosed operating floors.

Batch measurements are required to be accurate within 1% for cement and water, 2% for aggregate under 1½ in., and 3% for larger aggregates.

Bulk cement is unloaded into a Johnson 870-bbl. silo at a rail siding about a mile from the plant, trucked to the job and dumped into a hopper, feeding thence by bucket conveyor to a 7300-bbl. storage silo alongside the concrete plant. A screw conveyor supplies the batch bin under automatic control, aided by compressed air.

Concrete is supplied to 8-yd. (Garbro), 4-yd. (Johnson) and 2-yd. (Blaw-Knox) buckets carried on an electric shuttle car. This car travels along a ledge below the plant, positioning buckets under an aerial cableway which spans the gorge. Buckets are transported by cableway over the dam and lowered for dumping under telephonic control from the ground. The smallest batch mixed is one yard. While the concrete plant is designed for a maximum production of 220 cu. yd. per hour, the peak output to date has been only 135 cu. yd., with a typical steady daily average of 110 cu. yd. per hour meeting current demands. A second cableway being installed will permit a higher rate of concrete placement as the dam rises and more lifts can be poured at a time.

The cableway consists of a 3-in.-diam. steel cable with 1687 ft. span between towers. The cable was manu-

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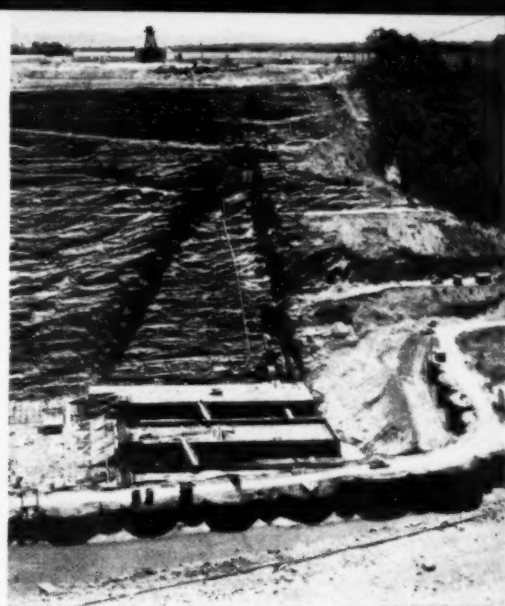
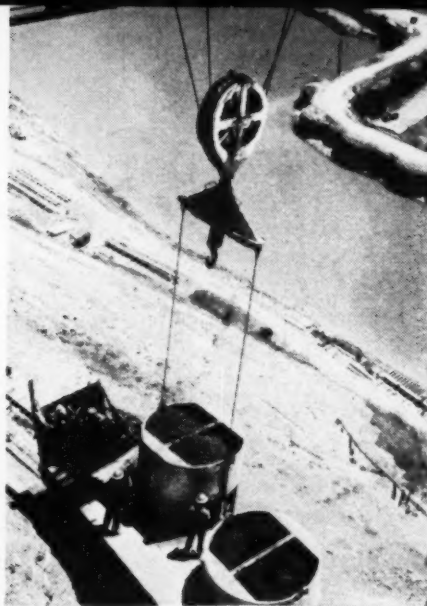
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★ How the dam will notch into canyon walls . . . a bucket being lifted from rail shuttle for trolleying out over the work . . . view of concrete plant as seen from the pit



factured by American Cable Company; the head tower by the American Bridge Company. The two tail towers were brought from Shasta dam, and reconstructed to fit the project. Hoisting equipment is Lidgerwood.

#### Gradation and Mix Design

The concrete for the dam falls into 18 use classifications, with a specification for each. Mass concrete for the gravity section and stilling basin incorporates aggregates up to 6 in. max. For other classes of work, the top size is 3", 1½" or ¾". Concrete for gravity sections and stilling basin concrete is comparable to that usually designed for 3,000 lb. per sq. in. at 28 days; all other concrete, 3,500 lb. per sq. in.

The mass concrete, which will be discussed chiefly here, is designed as a 3-bag mix, the cement factor variation being kept well within 0.1 sack per cu. yd. A water-cement ratio of 0.62 (7-gal. mix) is used.

6% for the minus 1½ in. material. Air in the total mix is running 4.1% to 4.3%, and from 5½% to 6% for the minus 1½-inch material which for lean mixes for mass concrete work is not considered detrimental by the engineers. Air entrainment is employed to secure greater workability with less water and as an aid to durability. The addition at the plant is made automatically at rates set from 3½ to 4½ ounces of 5% solution of N.V.R. per cubic yard of concrete.

A typical aggregate gradation for mass concrete is as follows:

Per cent of each size to total coarse aggregate	(6"-3" 30%) (3"-1½" 30%) (1½"-¾" 22%) (¾"-No. 4 22%)	26%
Per cent of sand to total aggregate = sand specification	Sand	26%

The combined gradation of coarse aggregate is required to be within the following limits:

U.S. Std. Sieve	Square Mesh No. 4 ¾"	% by wt. Passing Individual Sieve ¾-1½"	1½"-3"	3"-6"
7"				100%
6"				90-100
3"			90-100	0-15
2"			20-55	0-5
1½"		90-100	0-10	
1"		20-45	0-5	
¾"	90-100	0-10		
¾"	30-55	0-5		
No. 4	0-5			

Mixing time for mass concrete is specified at 2½ minutes minimum and usually runs to 3 minutes.

Type II-A cement is used, which is an air-entraining cement for use in general concrete construction and in construction exposed to the moderate sulfate action, or where moderate heat of hydration is required.

Cement is supplied from two manufacturers, with Neutralized Vinsol Resin inter-ground and additional quantities of a 5% N.V.R. solution added at the plant to secure a specified entrained air content of 3%—

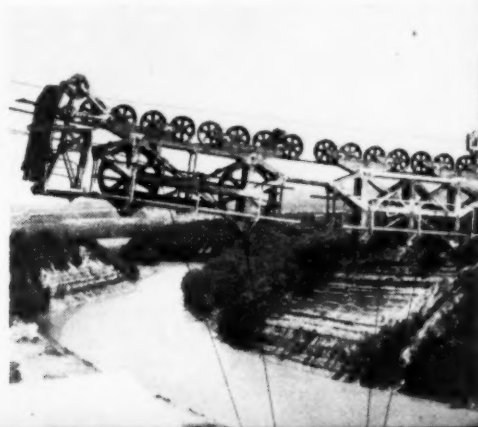
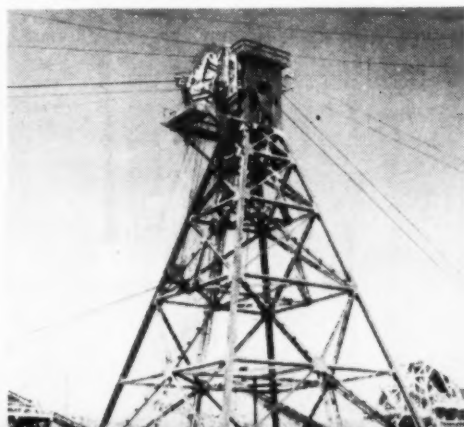


★ The bulk cement unloading plant, involving short truck haul to silo located up on the rim adjacent to the concrete plant

The percentage of fines is watched with special care, since considerable breakage occurs in aggregate handling and mixing as noted in the section on aggregate production. Samples of freshly mixed concrete unscrambled in the field laboratory reveal that mixes beginning with 10% to 14% of minus-50 material, as determined from sieve analyses of mix-

(Continued on page 83) 81

★ Tower and trolley of cableway





★ The concrete plant is perched just below canyon rim. Cement silo at left (not visible). Ice making plant at left. Belt in foreground feeds aggregates from tunnel located under the various stockpiles



★ Glimpse of upper corner of batch plant wall. Note battery of floods pointed into pit 450 ft. below, and chutes by which aggregates are dropped into the bin compartments

### Some of the Features of the Mt. Morris Concrete Plant

**Storage Bin Arrangement:** Central cement tank in overhead bin divisible into compartments for various cement types . . . Aggregate bins arranged radially around center cement tank . . . Aggregates distributed from a central pivoted turnhead to the aggregate compartments . . . Mixers arranged radially about a central point, for most direct flow of material from batchers.

**Batch Hoppers:** Separate single material batchers for each size of aggregate; also for cement, and water . . . Cement stream introduced in center of aggregate stream for greatest possible pre-mixing action.

**Discharge gates** electro-pneumatically operated. Electric timer provides adjustable delay period in the opening of any batcher discharge gate.

**Batcher fill valves** electro-pneumatically operated; two-stage filling for accurate and fast weighing.

**Automatic Batcher Control:** All dial scales built into a single control cabinet, along with recording device and batcher electrical controls . . . Dials have divisions to at least  $\frac{1}{2}$  per cent of full scale reading.

**Mix Selector:** Electrical batcher weighing control mechanism can be instantly set to any one of 12 pre-set batch weights, by turning single knob and pointer . . . Minor changes in a mix can be made in a fraction of a minute.

**Moisture Compensation:** Sand batcher scale is provided with a moisture compensating device, which automatically weighs up an additional amount of moist sand in the sand hopper depending upon the percentage correction set on moisture compensating dial. This correction will apply to any and all mixes selected. The dial and recorder chart indicates the weight of dry sand in the hopper . . . This additional weight (water in the

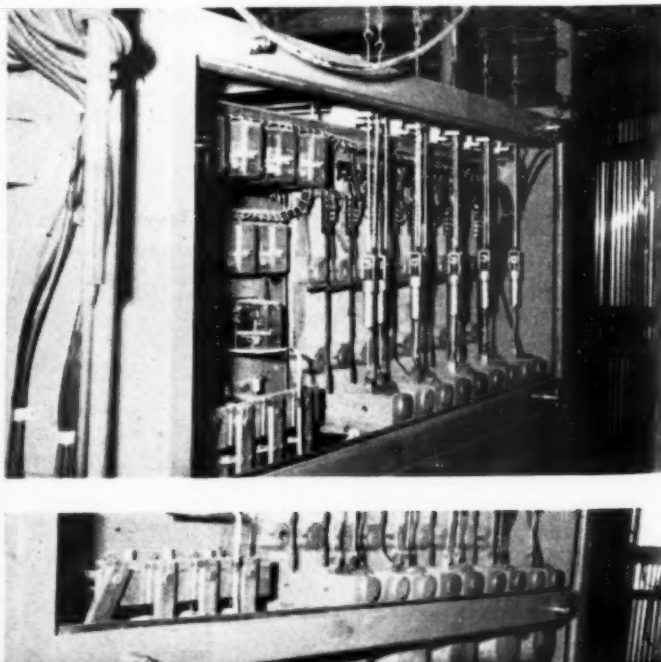
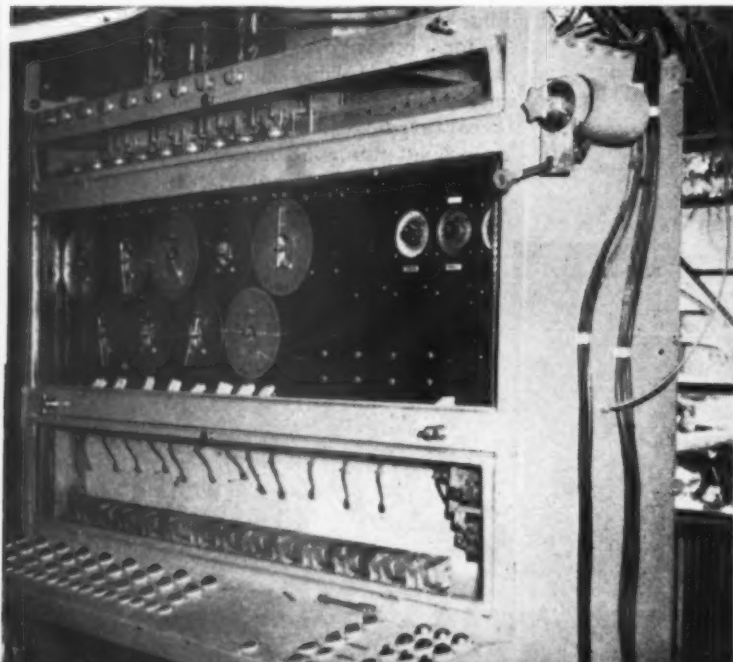
sand) is automatically subtracted from weight of water preset on the water batcher scale control.

**Recorder:** Recording chart pens operate directly from scale mechanism on a pen arm assembly . . . Chart shows a graphic pen record weight of each material weight on parallel graphs on a single wide sheet of paper . . . Time-stamps the year, month, date, hour and minute on the chart when each batch is discharged . . . Electric counter counts total number of batches discharged.

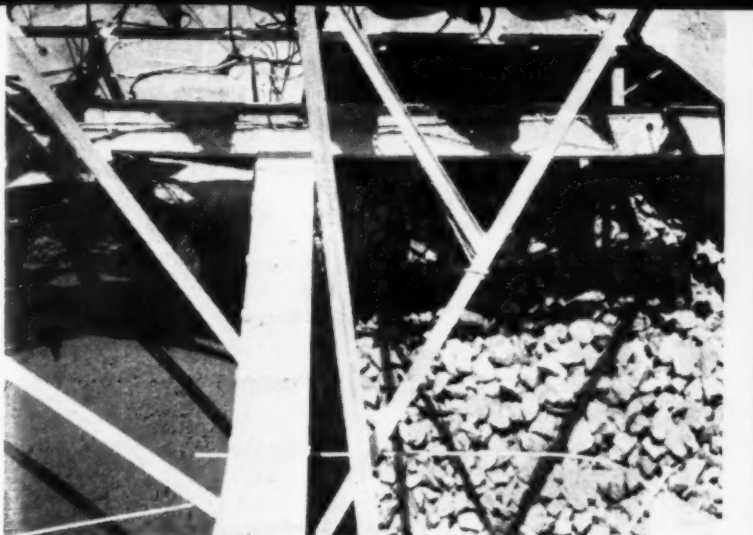
**Interlocks:** Any batcher can be discharged separately by push button control (for wasting any one batch of material) . . . Mixers can be interlocked so that with the proper limit switches mounted on each mixer, the batchers cannot be discharged unless each batcher has completed its weighing and does not show over-weight or under-weight, and other conditions are met.

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★ Right: Rear of control panel, which rises through center of operator's room. In upper scene, note wires leading through ceiling from the tare controls. These wires connect with a device for automatically adjusting mix ingredients to compensate for variations in sand moisture. Left: General view of instrument panel, as seen from the operator's stand







★ Left: Looking into two of the aggregate bins located immediately over the mixers. Right: Glimpse of swivel chute, with power-controlled collar about to clamp tight on mouth of one of the three tilt-type mixers

(Continued from page 81)

ing plant bin samples, may show as high as 18% of such fines in the freshly mixed concrete.

Specifications for sand call for a fineness modulus between 2.40 and 2.90. From mix designs supplied initially from Vicksburg, the field staff experimented to get the most workable mix, 1½" to 3" slump limits being specified.

### Controlling Concrete Temperatures

The mass concrete in Mount Morris dam is placed without cooling pipes, but the concrete mixture has been cooled by iced water rinse on the aggregates and by addition of tube ice. Specifications require that freshly mixed concrete not exceed 70 deg. F. in warm weather, and the mix is kept down to 50 deg. in cool weather. The heat of hydration of the cement used is estimated to produce about a 28 deg. rise from mixing temperatures.

Beginning in April cooling necessary was done by running 35° F. water over the rinsing screen as the aggregates were belted to the batch plant, and by cooling the mix water to 35° F. Water is cooled in a Vilter 75 gpm tubular refrigerating system, such as is used in airconditioning.

The unusually hot weather of June required a few shut-downs due to excessive concrete temperature (over 70° F) despite this cooling. Early in July a 30-ton-per-day Vogt ice-making plant began operation, the plan being to introduce ice as part of the mixing water.

## Recent Developments in Corps of Engineers Thinking on Concrete

(Highlights condensed from paper by Jesse R. Gilbert, Office of Chief Engineers, "The U.S. Corps of Engineers' Approach to More Durable Concrete", which was presented before the National Crushed Stone Association at its 32nd annual convention. The entire paper is published in the June issue of the Association's "Crushed Stone Journal"—Editor)

1. Surveys of existing projects by the Corps of Engineers show a need to improve concrete making techniques. Concrete structures have not always shown satisfactory durability.

2. The causes of the sometimes alarming lack of durability are attributed to many factors: mix ingredients, mixing, placing, curing.

3. As a direct result of inadequate service records of existing structures, the Corps has initiated research programs of unprecedented scope. Laboratory facilities are being expanded, existing construction procedures improved, new procedures developed. The Corps' concrete research division is investing over \$300,000 during

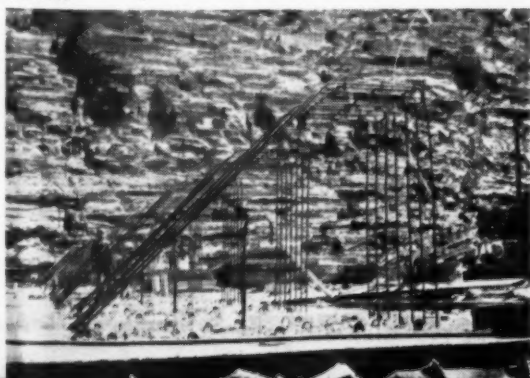
1949 on basic research.

4. Research includes special studies in air entrained mass concrete, aggregates for such concrete, alkali-aggregate reaction, permeability, grouting, uplift, special cements, concrete forms and linings, vacuum and prepacked methods, and numerous concrete products.

5. As to aggregates, the Corps' intent is to use the best aggregates, locally and economically available to any construction project. It is not the intent of the Corps to insist on concrete aggregates vastly superior in quality which will greatly increase a project's expense. Specifications have been quite generally relaxed for smaller structures. But specifications more rigid than those which have prevailed in a region for ordinary road and structural work are often considered justifiable for large multiple purpose projects, where the loss that might entail from lack of utmost durability becomes serious.

6. The Corps has been criticized severely for not accepting certain locally available aggregates, but de-

★ Left: Reinforcing in place for one row of concrete baffles which will stud the heavy concrete stilling basin floor downstream from the dam. Center: Curing spray bars doing their stuff. Wet sand cure also employed on large horizontal surfaces such as stilling basin slabs. Right: Drilling weepholes and grouting holes, using a Sprague & Henwood unit which incorporates an I-R compressed air hoisting motor, which forces water through a hollow shaft to cool the diamond drill







★ Left: Downstream face of dam beginning to take shape. Steel forms employed. Circular cofferdam pile clusters in background. Right: Condenser unit for ice making machine



★ Boss-man of the job, superintendent W. T. Greeley, facing camera, talking to Whitey Wixen, foreman

fends its decisions in such cases on the grounds that service records for a particular aggregate often are unsatisfactory. Just because an aggregate has been used "for years" for ordinary concrete work doesn't mean that it is good enough to build into a multi-million-dollar dam.

7. The Corps' present contract specifications for civil works are unique in the history of concrete making, in that they contain no performance limit for the concrete or ingredients, except gradation and uniformity requirements for the aggregates and the amount of entrained air in the concrete. Absent are the conventional limits for sulphate and abrasion losses, absorption, and deleterious substances. Nor is there any mention of slump, minimum strength, minimum cement content, or maximum water content. This policy is a deliberate one, adopted after long consideration.

8. The Corps personnel considers unfortunate the repeated use of terms

such as "thermal compatibility" in discussing the controversial policy of requiring manufactured sand. The Corps in studying aggregates for large projects is particularly interested in three tests other than the usual tests for sulphate loss, specific gravity, absorption, abrasion, and mechanical analysis. These three tests seek to determine the physical properties and mineral constituents of the materials and the possibility of occurrence of harmful chemical reaction between certain of these constituents and the alkali in the cement; behavior of the concrete when subjected to weathering; and the thermal properties of the materials and their effect on the concrete.

In considering factors affecting large dams, investigation includes thermal diffusivity, specific heat, alkali-aggregate reaction, and coefficient of thermal expansion.

9. Thermal expansion considerations thus put in their proper place is one of numerous phases to be considered. However, the differences in thermal coefficient are sometimes of great importance, particularly in the coarse aggregates which take up 80% to 90% of the mass of the concrete. The values may range from about 3 times  $10^{-6}$  cc for most limestones to 7 times  $10^{-6}$  for siliceous aggregate having a high coefficient of thermal expansion.

10. Much reliance is placed today on preliminary petrographic studies. These quickly rule out obviously unsatisfactory aggregates.

11. Ideas have had to be revised as to the percentage of fines in concrete for mass structures. Whereas formerly as much as 10% to 15 of

minus 100 material was considered good, along with considerable minus 200 material, today the Corps personnel seek to limit the minus 100 material to 3%, or even 0%, knowing that fines are created in the stockpiling, belting and mixing.

## Mexico Highways Now Extensively Paved

The Mexican highway system today is well paved along most principal routes. According to the International Road Federation, Washington, D.C., 52 important links totaling 5499 miles are classed as "all paved." Nine sections totaling 1067 miles are classed as "all weather."

The Texas Highway Department has repainted all roadway vehicles except passenger cars, a bright Armour yellow, and equipped them with red flags. The action was taken to reduce the heavy toll of accidents formerly involving construction and maintenance crews. In four years 5 employees were killed and 118 injured by drivers who failed to slow down when approaching work areas.

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## Sampling and Testing Aggregate Plant Output, N. Mex.

(Continued from page 79)

ards, our central laboratory and our field laboratories are set up to work to these standards. In our control laboratory at Albuquerque, we handle these tests on a sort of assembly line basis. The operators here are old hands, very fast and accurate. They are not under pressure as are the field inspectors, but even so, because of greater experience, they can get out results much faster than the field men. Better arrangement of central laboratory equipment helps too.

Briefly, the AASHTO methods call for drying the sample and washing out the minus 200 mesh material. Drying ovens are furnished the field laboratories. These ovens are heated by Coleman type gasoline burners or, where available, butane. The dried sample is then shaken through a device such as Fig. 5. With a well-organized crew this operation from start to finish can be completed in 30 minutes. In the meantime, 200 tons of finished product have gone through the plant and have been delivered to the road. Do you believe that this one sample is representative of the two hundred tons? Our field laboratories seldom get a test through in less than 45 minutes, in this situation the post mortem represents! three hundred tons.

Drying accounts for most of the lost time. Another time-consuming affair is the dry sieving. The shaker screen shown in Fig. 5 has a lateral and vertical motion, accompanied by a jarring movement induced by a cam. These various movements are prescribed in detail under AASHTO T-27-42 and the ASTM counterpart C-136-39. The Tyler shaker faithfully produces the prescribed motions. None the less, the operation takes too long.

### Mechanical Analysis by Wet Method

Attempting to cut down the testing time, this laboratory experimented with a method which would eliminate drying. As a first step, it was necessary to determine the specific gravity of the various sizes. This has to be done for every pit. Knowing the specific gravities, it was possible to run water through a nest of sieves, arrive at the minus 200 by difference, and get the percentages passing the other sieves by weighing the retained material in a pycnometer. A moisture sample, quick-dried, gave correction.

This method did eliminate the drying time and could be performed in the central laboratory faster than T-27-42. But when we tried it in the

field laboratories, where we did not have tap water under pressure, the method proved slower than the AASHTO method. We found that the water packed the -10 mesh material and effectively prevented -40 and -200 from going through. Water under city pressure would break up the blanket, but without pressure it was no go.

It became evident that some device that would keep the meshes open without the necessity of having water under pressure was needed.

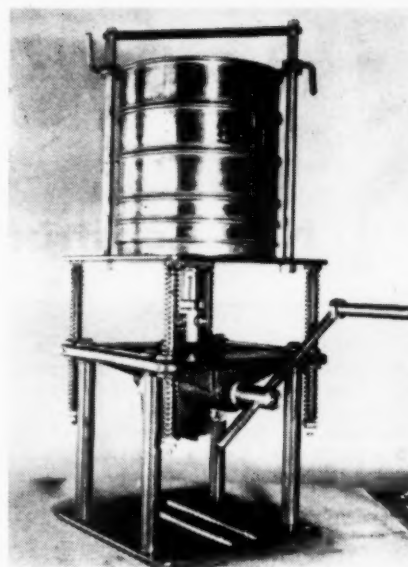
Several years ago, a vibratory device was gotten up by Bureau of Public Roads engineers in an attempt to secure the maximum density in granular masses—to attain as nearly as possible the densities reached in a bituminous pavement under traffic. In other words, to ascertain the minimum void space, a matter of great importance in the design of asphaltic concrete. A very great vibratory effect was induced by means of shafts rotating in opposite directions under a steel plate. By means of adjustable weights, set at various angles, vibration could be increased, decreased, or completely eliminated.

### Equipment Experimentation

This thing looked as if it might furnish the answers we were looking for and we set about copying it in a distinctly distant fashion. For the steel plate we substituted a piece of 2 x 12 lumber. For the counter-rotating shafts we used half-inch bolts with odd looking weights hung here and there. Power was furnished by the motor of a Marshall Stability machine. It required a considerable effort of the imagination to relate this Goldberg contraption to the Bureau of Roads machine.

But it worked! It would fall apart at times but when it was working it would sieve a sample through in two to three minutes, and it did not require water under pressure.

We took the Goldberg, as we called it, to a local machine shop and asked them to make it up in metal so that it would hang together. The machine men studied this curious apparatus for some time. Finally, they came up with a device using a simpler mechanism to produce the vibratory effect and costing a great deal less than our device would have.



★ Fig. 6—New wet-sample power shaker

This device, the Hiatt-Johnson vibratory shaker, is shown in Fig. 6. It is a rugged affair. The picture shows it adapted for hand operation but it can also be fitted up with motor or belt drive. With average base course aggregate the sample is put through in three minutes, using a gallon of water per minute. This light water requirement is of importance when water has to be hauled to the field laboratory and used over again after the suspended matter has settled out. The machine is manufactured by the Albuquerque Precision Tool & Die Co., 4509 North 4th St., Albuquerque, N. M., who have applied for patent. Table I below compares results on identical samples.

While the vibrator requires only 3 minutes or less to complete the sieving operation, remaining operations of weighing in pycnometer, picking out the proper weights from a prepared table of specific gravities, records, etc., take up another 9 or 10 minutes so that the whole wet operation takes from 12 to 15 min. However, this cuts the time in half, a long step forward. We expect to cut the time still more with a different type of pycnometer.

This paper presents the writer's thoughts concerning present behind-the-time methods of sampling and testing product of present day aggregate plants. He has attempted, briefly, to suggest improvements.

Comparison of Sieve Analyses Made on Split Samples of Surfacing Material by the AASHTO Standard Method and the Wet Vibratory Shaker Procedure

Lab. No.	A.A.S.H.O. Standard Method		Wet Vibratory Shaker	
	% Passing No. 40	% Passing No. 200	% Passing No. 40	% Passing No. 200
98240	11.0	6.4	10.3	5.6
98241	10.3	6.7	9.4	6.3
98242	10.7	6.4	10.5	6.0
98243	16.9	9.9	14.7	9.6
98249	12.5	5.9	12.3	5.8



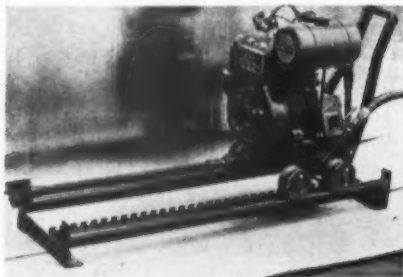
## NEW EQUIPMENT AND MATERIALS

### New Construction Equipment and Materials

900

#### Earth Boring Machine

A new line of Earthworm boring machines perfected by Lube Jack Co., 1415 14th St., Santa Monica, Calif., is stated to provide for laying of pipe lines of all types up to 3 in. in diameter and up to 150 ft. in length, without the need of breaking surface ground for such operations. In many applications, it is pos-



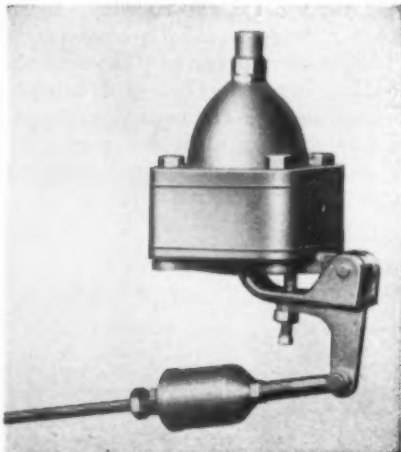
New Earthworm Boring Machine

sible to use pipe or conduit as drill stem sections and leave it underground as a permanent installation. It is stated that accuracy of the units, when drilling lines as long as 150 ft., can be maintained within 1 in. of the target area. In operation, water is forced through the drill stem as a lubricant and to wash back the cuttings. Three types of bits are available to work in all types of soil. A choice of 3-power rated models are available.

901

#### Speed Regulator for Compressors

An improved regulator for its "Drill-More Capacity Control" has been announced by Ingersoll-Rand Co., 11 Broadway, New York, N. Y. According to the manufacturer, this new UL-83 "Floating-Speed" Regulator is much simpler in operation and easier to adjust than the original Multi-Speed regulator which Ingersoll-Rand pioneered in 1939 and has



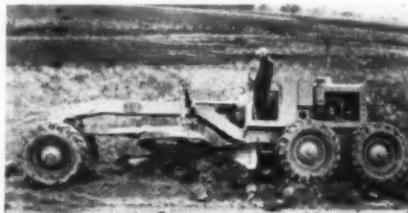
New "Floating Speed" Regulator

since used on all 105-cfm and larger portables. Speed steps and cycling are eliminated. Average air pressures are 15 to 20-psi higher, and savings in fuel are up to 40%. Whenever less than full capacity of the compressor is used, the new "Floating-Speed" Regulator is stated to slow down the compressor to the lowest practical working speed that compresses just enough air to hold the pressure. When the air demand changes again, the speed "floats" up or down to the exact speed required. The compressor capacity is varied throughout the entire speed range without speed steps or cycling.

902

#### Motor Grader

A new heavy-duty motor grader has been added to the line of road construction and maintenance equipment of Huber Manufacturing Co., Marion, Ohio. Weight of the new grader is 24,500 lb. without scarifier and 25,800 lb. with scarifier. Blade pressure without scarifier is 12,440 lb. and with scarifier, 14,-



New Huber Heavy Duty Motor Grader

620 lb. The scarifier attachment is offered as optional equipment. Overall length of the machine is 25 ft., 9½ in.; width is 7 ft. 10 in. and height with cab 10 ft. 4 in. Outstanding features of the grader include: Hydro-mechanical controls; 27½ in. front axle clearance; 87 in. shoulder reach; mechanical steering; Hercules 130 h.p. full diesel engine; 4-wheel hydraulic brakes and easy accessibility to all operating parts for maintenance and service purposes. The Grader has eight speeds forward ranging from 1.31 to 20.63 miles per hour. There are two speeds reverse, 1.92-4.73 miles per hour. It's equipped with the Oliver transmission.

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See business reply cards in this publication. Just enter the number or numbers of the new products items on which you want further data, fill in address, and mail to the Editors. We'll pass your request to the manufacturers without obligation.

903

#### Units for Motor Grader

A rear-mounted bucket loader and a V-type hydraulically controlled snowplow have just been introduced as specially designed allied units for the new Model D motor grader of Allis-Chalmers Tractor Division, Milwaukee 1, Wis. The rear-mounted ¾ cu. yd. loader manufactured by the Tractomotive Corporation, Deerfield, Ill., has been built to take advantage of the new Model D's many outstanding features. Loaders are shipped knocked down to the dealers and can be



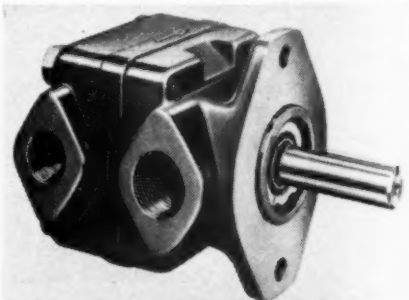
Model D. Grader with Bucket Loader and Snow Plow Units

installed in the field with ordinary mechanic's hand tools since no cutting, drilling or welding is required. . . four simple sturdy clamps attach loader to grader frame. A V-type hydraulically controlled snowplow manufactured by the Baker Manufacturing Company, Springfield, Ill., is the other piece of special allied equipment designed to increase the year 'round capacity of Allis-Chalmers' new Model D grader. A bulldozer blade that is interchangeable with the V-plow is available to further increase overall versatility. The new Baker V-plow is 8 ft. wide at the bottom, 9½ ft. wide at the top. It is flexibly attached to the push bars and hydraulically adjustable for correct snow moving positions.

904

#### Hydraulic Pump

A new Series V-200 balanced vane pump, announced by Vickers Incorporated, 1432 Oakman Boulevard, Detroit, Mich., is expressly designed for the specialized requirements of the mobile equipment industry. A major feature claimed for this new pump is longer life



Vickers Series V-200 Balanced Vane Pump

at maximum efficiency, as it is designed to automatically maintain correct radial and axial clearances at all times. It is stated that not only is normal wear perfectly compensated, but the pump also



automatically adjusts its clearances to oil viscosity variations resulting from temperature change. As a result, correct clearances are maintained and more oil is delivered for useful work. The tried and proven Vickers feature of "hydraulic balance" eliminates bearing loads resulting from pressure. The "Vane principle provides for no-load starting—important in cold weather cranking. Greater mounting adaptability is another feature. The V-200 Pump is made in four capacities for operating pressures up to 1000 psi.

#### 905 Rock Bit

Development of a new Joy Sulmet rock bit, designed for general drilling application, has been announced by the Joy Manufacturing Company, Henry W. Oliver Bldg., Pittsburgh 22, Pa. It is a

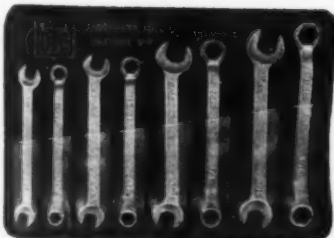
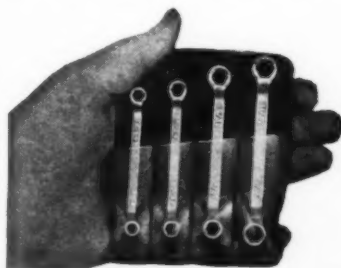


New Joy Sulmet Rock Bit

skirt-type bit of the four-point cross design with tungsten carbide inserts for maximum penetration. It is available immediately in sizes as follows: 1 3/8 in., 1 1/2 in., 1 3/4 in., 1 7/8 in. and 2 1/4 in. Other sizes will be made available at a later date.

#### 906 Wrench Sets

New wrench sets announced by Owatonna Tool Co., 319 Cedar St., Owatonna, Minn., are designed especially for electrical, carburetor and instrument work. Each wrench has a different opening on each end, thus providing a wide range of required sizes. All wrenches are drop-forged from alloy steel and fully heat-



OTC Midget Wrench Sets

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treated for strength and long life. Each set in a handy plastic kit. No. BW-4L Set has 4 wrenches with 8 sizes of hexagon openings: 3/16 in. x 13/64 in., 7/32 in. x 15/64 in., 1/4 in. x 9/32 in. and 5/16 in. x 11/32 in. No. BE-SL Combination Set includes Box Wrenches in sizes 3/16 in. x 13/64 in., 7/32 in. x 15/64 in., 1/4 in. x 9/32 in. and 5/16 in. x 11/32 in., and open end wrenches in sizes 7/32 in. x 13/64 in., 1/4 in. x 15/64 in., 9/32 in. x 11/32 in. and 5/16 in. x 3/4 in.

#### 907

##### 6-in Log Log Slide Rule

A new, 6-inch Duplex Type All-Metal Log Log slide rule, bearing the regular 10-inch Log Log scale arrangement, is announced by Pickett & Eckel, Inc., 5 South Wabash, Chicago 3, Ill. This new

rule is stated to incorporate the following features not available before in a 6-inch rule: The following 16-scale arrangement, according to the manufacturer, makes this the most powerful 6-inch-rule available: Front: LL1, A-B, T, S, C-D, LL2. Back: LL3, DF-CF, CIF, CI, C-D, L. Dimensionally stable magnesium alloy body, with optical tongues and grooves machined to .001" accuracy, insures permanent alignment, freedom from distortion and easy operation. Needle-sharp graduations, on scales optically-spaced for easy reading, result in easy settings, and computational accuracy comparable with that made on a 10-inch rule. The combination of C-D scales on both sides of the rule, together with folded and reverse scales, speeds figuring and avoids going "off-scale."

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#### 908

##### Diesel Locomotive Crane

A new 10-ton diesel locomotive crane announced by American Hoist & Derrick Co., St. Paul 1, Minn., is stated to be engineered especially for high speed work and for use on lighter jobs where the use of a larger crane would be less economical. Powered by an electric-starting diesel engine developing 72 h.p. at



Model 410 Diesel Locomotive Crane

1600 r.p.m., the new Model 410 has a rated capacity of 20,000 lb. with a 40-ft. boom at 12-ft. radius. It has a full-vision cab, tandem band air-controlled clutches, and will perform all operations simultaneously. The machinery deck is compactly arranged, with all units easily accessible. Other design features include welded construction throughout, ball and roller bearings, precision cut gears running in oil, and a quick-action boom hoist under positive control at all times. The three speed selective transmission allows shifting from one speed to another while the crane is in motion. Travel speeds in the respective ratios are 2.25 m.p.h., 8.0 m.p.h., and 15 m.p.h.; drawbar pulls are 8160 lb., 2060 lb., and 950 lb. The Model 410 has a 7500 lb. single line hoisting pull at 235 f.p.m. Slewing speed is 2.5 r.p.m.

#### 909

##### Scoop with Fluid Drive

Mixermobile Manufacturers of Portland, Ore., has announced the adaption of Chrysler fluid drive to the Wagnermobile Model "C" Scoop. This scoop is a versatile unit with scoops in five sizes and many other attachments including



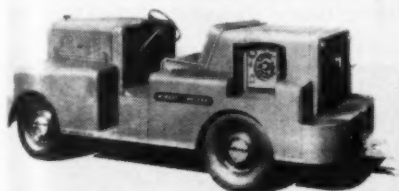
Wagnermobile Model "C" Scoop

$\frac{3}{4}$  cu. yd. concrete hopper, crane boom, lift forks, and fertilizer or hay forks. Attachments can be quickly changed on the job by one man. The load lifting capacity is 4,000 lb. Hydraulic controls fold down top section of the hoist track giving an overall height of only 98½ in. for work with low overhead clearance. The track reaches a height of 26 ft. with standard track extensions. The Wagnermobile Model "C" scoop with fluid drive has power steering, hydraulic controls and is powered with the Chrysler industrial 8-cylinder, 114 h.p. engine.

#### 910

#### Self-Propelled Arc Welder

A new mobile welding unit, announced by Hobart Bros. Co., Troy, Ohio is equipped to roll along to the job under its own power and make on the spot repairs with arc welding, oxy-acetylene welding and cutting, and power tools. A universal coupler is provided on the



Hobart Weldmobile

rear, to permit towing of additional equipment such as trailer mounted welders, air compressors, etc. Two new models are now being produced, the GR-301-M with a 300 ampere welder for light to heavy welding requirements, and the GR-401-M with a 400 ampere welder for medium to extra heavy welding requirements. Either unit can be furnished with 1 or 3 k.w. auxiliary d.c. power for supplying lights and universal power tools.

#### 911

#### Front-end Spinner Puts Carpet Under Truck

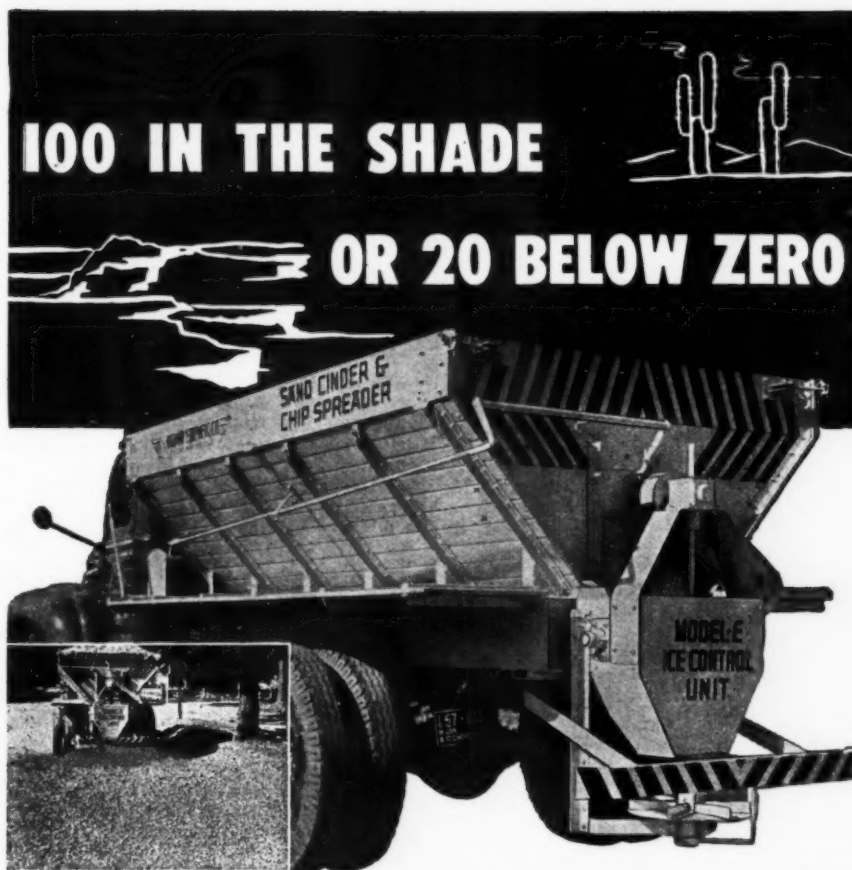
Trucks spreading chips in the wake of the bituminous distributor can travel forward while spreading, yet avoid tracking through the fresh application by use of a new device called the "Roadsaver". Manufactured by Gabb Manufacturing Company, 16 Orchard St., East Hartford, Conn., the equipment is a surface material spreader which fits under the chassis of an ordinary dump truck. A frame extends under the truck, and on it, in the rear, is mounted a hopper which receives material from the tailgate. Material passes under the truck along an endless belt, to a spinner with power unit mounted in front.

This easily demountable unit can be adjusted to spread any amount of material per foot of travel, and spread any width up to 12 ft. For further facts, address the company as given above.

#### 912

#### Concrete Curing Equipment

A sprayer unit, now in production by the Devere Co., Racine, Wis., is reported to cure concrete in strips from 6 to 20 ft. wide at a labor cost of \$8 per mile. The Devere sprayer features a tank, pump and 2 h.p. gasoline engine mounted on an all-steel, two-wheeled chassis which is readily portable. Standard equipment includes an 8 spray-head unit which simultaneously treats a 6-ft. strip. Available as extra equipment is an ad-



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- Spreading sand and cinders for ice control on streets, highways airport runways, etc.
- Spreading calcium chloride for dust control on secondary roads, parking lots, airports, fair grounds, etc.
- For seal coat work, spreading chips, sand, etc., over newly laid oil or blacktop
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- Hauling crushed rock and chips
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#### CHECK THESE 14 FEATURES SAVE TIME, MATERIAL, MONEY

1. Uniform spread at all speeds.
2. Covers 2 or 4 lane highway in one operation.
3. Spreads material on highway where needed. No material wasted on shoulders.
4. Operates forward or reverse.
5. Spreads to right, to left, or both sides as desired.
6. Material is cast low to ground—no interference with traffic.
7. Spread may be started or stopped with truck in motion.
8. All controls within easy reach of driver's seat—one-man operation.
9. Material is also spread ahead of rear wheels of truck assuring traction and safety at all operating speeds.
10. Electrically welded all steel frame.
11. Wooden hopper eliminates corrosion from chlorides, assures longer life; also wet material won't freeze to sides in cold weather as is often the case with a steel hopper.
12. Ball bearing gear boxes, oil tight, dust and water proof.
13. Self-unloading 24" wide conveyor assures steady material flow.
14. Hopper sides hinged for easier hand loading. Lengths to fit any truck chassis.

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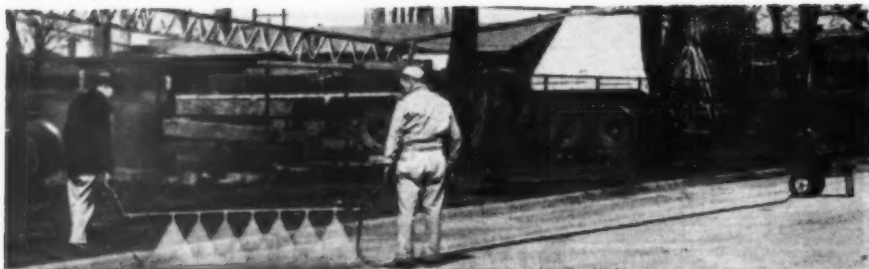
MANUFACTURERS OF THE WORLD'S MOST COMPLETE LINE OF SPREADERS



#### MODEL "DD" MOTOR DRIVEN SPREADER

Clamps onto tailgate of any dump truck. Handles sand and cinders for ice control, calcium chloride for dust control, equally adapted for seal coat work. Does the work of 5 men casting by hand. 1½ H.P. Briggs and Stratton power.





Devere Sprayer in Use on Curing Job

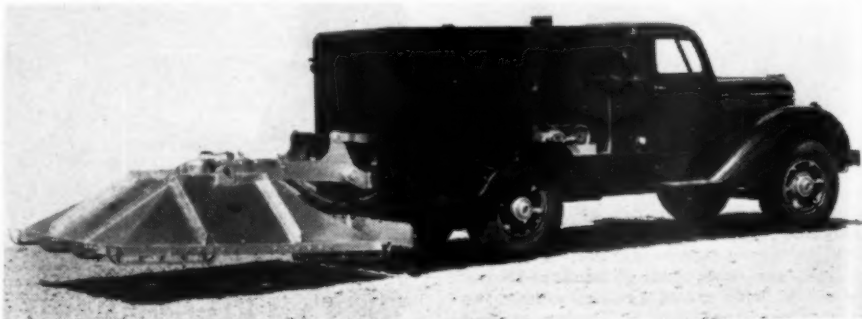
justable boom which may be placed on bridges or carried by two men. This boom is especially useful on jobs where specifications call for the concrete to be cured while the surface is still too soft to walk on. Standard equipment also includes 50 ft. of hose, together with a single nozzle boom for spraying inaccessible places like curbs, gutters, doorways, etc.

913

### Asphalt Surface Heater

A new Clarkmore asphalt surface heater, brought out by Asphalt Maintenance Co., 41 Park Row, New York 7, N. Y., will, it is claimed, successfully remove to an average depth of 1 in., 3500 sq. yd. of asphalt pavement in an 8-hour period. The surface heater unit is mounted on a 2½-ton Diamond T truck chassis built for power at low speed. (2 m.p.h.) All controls are located in such manner that the operator can operate and move the machine forward without the necessity of entering the cab of the truck. Dimensions are: Length, overall, 28 ft.; length (without hood) 19 ft. 7 in.; width, 7 ft. 5 in.; height, 7 ft. 6 in.;

weight (net), 12,410 lb. The heating hood is manufactured in sizes ranging from 5 ft. to 8 ft. with protecting guard for trees and low hanging foliage. The volume of air and fuel oil can be regulated or controlled in such manner that almost any size area can be heated that is desired. The heater is equipped with one burner. Fuel oil is forced into the burner under pressure and properly mixed with air. The heat from the one burner is deflected by the hoods surface to the pavement. An electric igniter is located in the top of the heating hood to fire the



New Clarkmore Surface Heater

fuel oil in the heating hood area. The control mechanism is located on the switch board panel of the auxiliary Wisconsin Engine and is operated by an electric push button.

914

### Diesel Engine

A new four-cylinder Cummins diesel engine with a maximum rated horsepower at 110 at 1800 rpm has been placed in production by the Cummins Engine Co., Inc., Columbus, Ind. The new HR-400 is light in weight and compact in size. Mounting dimensions for the basic industrial model are 43 7/32 in. x 29 3/4 in. x 47 3/4 in. The new HR-400 has a 5 1/4 in. bore and a 6 inch stroke, and a piston displacement of 495 cu. in. Like all Cummins Diesels, the HR-400 is a four-cycle engine, and uses the exclusive Cummins fuel system. It is equipped with standard two-valve heads; a new increased flow lubricating system; continuous groove main bearings; standard HR liners and head gaskets. The new four-cylinder Cummins diesel is avail-

# NOW AVAILABLE !

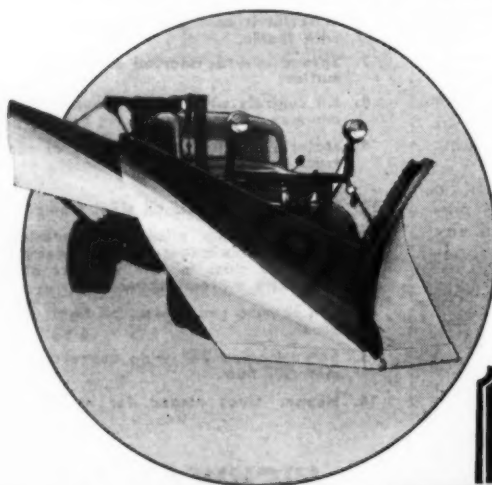
## THE FRINK MULTI-FEATURE SNO-PLOWS

**N**O more production "bugs"! No more waiting for the famous Frink Sno-Plow! Once again Frink offers you its famous snow plows in 15 different sizes . . . scientifically engineered for faster snow removal . . . easier operation . . . and greater dependability in any area. Simply choose the model best suited to your particular needs.

### MORE FEATURES

1. Exclusive self-ballasting feature prevents nose from "riding up" and prevents side slipping when widening out.
2. Full power hydraulic control permits easier handling.
3. Reversible cutting edges give double wear for greater economy.
4. Hinged deflectors keep windshields free from flying snow.
5. Side-leveling wings are optional.
6. Made for trucks with capacities from 1½ to 12 tons.

For further information write to Box P49W, Clayton, New York

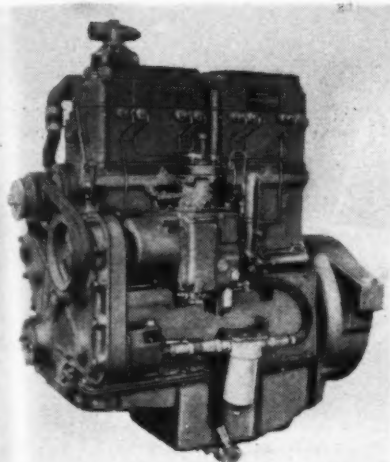


**NO WEDGE! NO SIDE THRUST!**

**NO BUCKLING! NO SIDE-SLIPPING!**



FRINK SNO-PLOWS, INC., CLAYTON, NEW YORK  
DAVENPORT-BESLER CORP., DAVENPORT, IOWA  
FRINK SNO-PLOWS of CANADA, LTD., TORONTO, ONT.



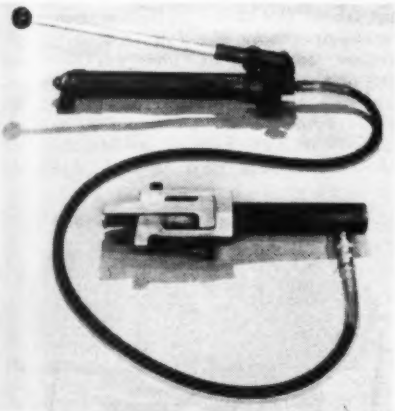
Model HRBI-400 Cummins Diesel Engine

able in an automotive model, HRB-400; five industrial models with special equipment making them applicable to various types of industrial applications, the HRBI-400, HRI-400, HRIP-400, HRP-400 and HRP-401; and a marine model, HRM-400.

#### 915

##### Earthmover Tire Remover

A new hydraulic tire remover for changing large earthmover tires has been perfected by Goodyear Tire & Rubber Co., Akron, Ohio. Especially designed to facilitate the breaking loose of these giant tires' beads from the rims, tool will operate on any tapered bead rim of



New Hydraulic Tire Remover

Goodyear design. Portable and highly compact, the equipment consists of a ram assembly 19 in. long, weighing 25 lbs., together with a pump and hose which provide hydraulic pressure for operating, the latter two pieces weighing 16 lbs. These work on both front and back side of rim making it possible to loosen damaged tires from rim so as to effect quick changes right on the job.

#### 916

##### Concrete River Weight

A concrete river weight that is easy to handle and economical to install, yet does an efficient job of weighing down under-water pipe, has been perfected by the Universal Concrete Pipe Co., Columbus, Ohio. The new weights are of rounded construction, which makes for quick and easy handling because they allow the pipe to roll or twist while being laid. Handling is facilitated also because the weights are in two sections, which are bolted together after encircling the pipe. A special lifting hole is a convenient feature.

#### 917

##### Fluorescent Street Light

A new fluorescent street light announced by General Electric Co., Schenectady, N. Y., is stated to supply a softly diffused, virtually glareless light. The new street light is a cigar-shaped aluminum tube in which two pairs of eight-foot-long fluorescent lamps are mounted. Two long, highly polished reflectors, mounted back to back, direct the light from these lamps through clear plastic windows to the street pavement.

#### 918

##### Paving Breaker

A new bulletin on its 52 AJ paving breaker, issued by LeRoi Co., 1700 South 68th St., Milwaukee 14, Wis., tells how

air pressure is utilized to lift the 82 lb. class breaker and free stuck steels. The 52AJ is an adaptation of LeRoi-Cleveland's Model 52 heavy paving breaker, with an integral air lift cylinder operated from the breaker handle. It is stated a force of 100 lbs. can be developed to assist the operator in handling the tool and freeing stuck steels.

#### 919

##### Cement Spreader

A new cement spreader, now in production by Hercules Steel Products Corporation, Galion, O., covers 5 to 10 ft. in width in any quantities required for soil-cement stabilized road building. Simple in operation, the machine spreads smoothly and evenly from one end to the

## For Efficient Production

ON SMALL AS WELL  
AS LARGE JOBS...



## H&B Model PA Portable Asphalt Plants



### MOTO-PAVER

The complete mixing and paving machine for mixed-in-place work. Write for Bulletin MP-47.

PA plants are designed to give efficient production on small as well as large jobs—under a wide variety of operating conditions.

PA plants may be driven with individual motors or from one main power unit for the tower and one for the dryer, using gasoline, diesel, diesel electric or electric power. They are easily portable by truck. Low over-all height is maintained by using a flat screen, and can be further reduced by use of a depressed driveway. Write for Bulletin P-46.

**HETHERINGTON & BERNER INC.**

721 Kentucky Avenue, Indianapolis 7, Indiana

**H&B Builds Portable and Stationary Asphalt Plants of All Types, Sizes and Capacities**



**Hercules Cement Spreader**

other through the use of a single chain with cross bars which drag the cement over a tapered plate from the broad end toward the pointed end. The spreader is coupled to the rear of any dump truck; when the dump body is hoisted, the cement is fed into a 10-foot hopper pro-

vided on the machine. Its wheels furnish power for equal distribution of cement over any width to which the machine is set.

#### 920 Fence Post Driver

A power post driver designed by a former county engineer for driving metal posts for snow fence is now being manufactured by Henrici Laundry Machinery Co., Henrici St., Mattapan Station, Boston 26, Mass. The driver is powered by a standard  $2\frac{1}{2} \times 2\frac{3}{4}$ , 1 cylinder gas engine with combination V-belt and chain drive. The hammer weighs approximately 100 lb. and has a free drop of 80 in. The machine is portable on any kind of a trailer or flat bottom truck. It is adjustable so that each post can be driven in the proper plane to the ground surface and after

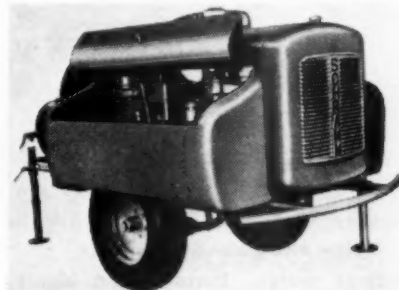


**Jordan Power Post Driver**

the post is driven, the truck or trailer can simply move forward and there is nothing on the machine to take off or disengage to permit the post to be separated from the machine. A few blows of the hammer will drive the post to the average depth. The operator manipulates the driver with one hand as one lever on the machine will both raise the hammer as well as release it for the blow.

#### 921 Compressor

One of the features of the new 105 Unistage Compressors, announced by Schramm Inc., Westchester, Pa., is the fact that the four cylinder Schramm engine operating the four cylinder compressor complement one another and 90% of the engine parts are interchangeable with the compressor, which reduces the carrying of service parts to a minimum. With an actual air delivery of 105 cu. ft., this unit is also equipped



**Schramm 105 Unistage Compressor**

with the Schramm Pneumastat assuring variable speeds and the elimination of continuous loading and unloading. Simplified design is stated to have resulted in a rugged outfit capable of 24 hours continuous service and the elimination of two staging and intercoolers.

#### 922 Rock Crusher

A new model 3030 New Holland double impeller breaker designed for primary crushing has been placed in production by the New Holland Manufacturing Co., Mountville, Pa. This is the second breaker now produced by New Holland for handling any stone passing a 30-in. opening. New design of the second model permits the feeding of longer slabs without bridging and results in greater production. Both 30-in. models will be kept in production. The present Model 3030 will be used as a secondary crusher and

Body Illustrated: Model RB-70, standard 7 cu. yd. rock body, specially constructed for quarry and rock work. Made in all capacities. Mounted over standard double-lift arm type under body hoist or telescopic hoist, depending on capacity and use.



## Keep ahead of schedule with "On The Job" Design

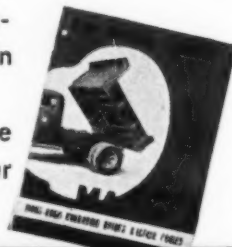
In Marion Bodies and Hoists you get dependable loading, hauling and dumping performance that keeps you "loads ahead." With "On The Job" design you get sturdy construction features developed by Marion engineers in the field under actual operating conditions.

Ask your Marion Distributor about the Marion unit designed "on the job" to meet your special requirements, or write direct.

**MARION**  
DUMP BODIES and  
HYDRAULIC HOISTS

**MARION METAL PRODUCTS CO., MARION, OHIO**

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Just mail a post card or letter for the complete Marion catalog, or ask your Marion Distributor.





as a primary crusher where unusually long slabs are not encountered. Major change in the Primary Model 3030 is the relocation of the adjustable breaker bar over one of the twin impellers in the breaking chamber. The present model has the bar directly over each impeller and a vertical path. The new model has a relocated bar over the impeller opposite the feed chute. Adjustable upward and outward, the bar moves to permit feeding of much longer material.

## 923

### Engine Generator Sets

Production of a complete line of fully-equipped and self-contained trailer-mounted electric generator sets in capacities ranging from 10KW to 85 KW, has been announced by International Diesel Electric Co., Inc., Long Island City, N. Y. These units, specially designed for on-the-job operation, can be easily moved



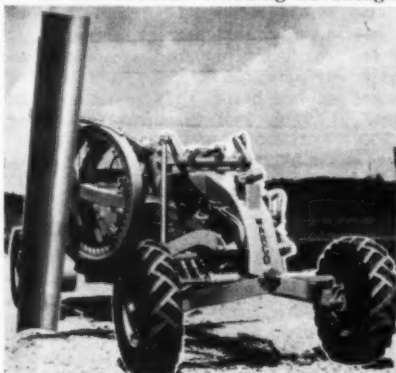
Engine Generator Set

from location to location. Available in both diesel and gasoline, 50 and 60 cycles, and in all standard voltages, these generator sets consist of an engine driving a generator, with an instrument panel containing all starting controls and switchgear, spring-mounted on a sturdy, pneumatic-tired four-wheel trailer. The trailer is equipped with a steel angle drawbar for attaching to truck or tractor.

## 924

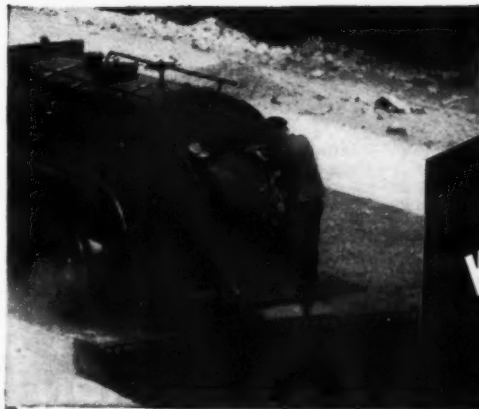
### Motor Grader

A new general duty motor grader, Warco's 76 h.p. model 4D-76, announced by W. A. Riddel Corporation, Bucyrus, Ohio, incorporates the many new features already built into the Warco 4D-100 which went into heavy-duty service earlier this season. Working advantages



Model 4D-76 Warco Motor Grader

claimed for these two Warcos include: a blade which (1) revolves in a full circle without removing scarifier or teeth, and (2) travels from 90° elevation on one side to 90° elevation on the other without the operator leaving the cab; effortless hydraulic control; a sliding moldboard for extra side reach; powerful Diesel motor; and ample working clearance.



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Whether handling oils, tars, asphalts, or emulsions, you can count on a Kinney Bituminous Distributor to give the smooth, uniform coverage called for in road, highway, and airport construction. Only this Distributor has the Kinney Rotating Plunger Pump — your assurance of precision bitumen application. Heated by hot engine exhaust, the pump is ready to go at all times. It delivers up to 405 GPM in a steady, non-pulsating flow and with meter-like accuracy. Simple controls and improved spray bars, spray nozzles, and heating system combine to make the Kinney Distributor easy to operate and 100% dependable. The Fraco Circulating Hot Spray Bar can be furnished if desired. Write for Bulletin A-48.

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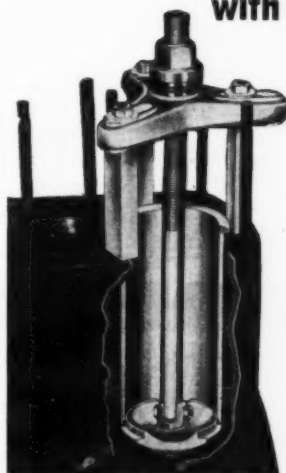
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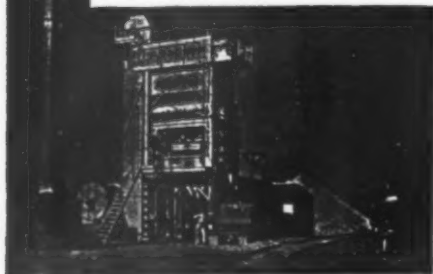
Write for new Catalogue RS-97, of Engineering Instruments, Engineering Field Equipment and Drafting Room Supplies.

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## PORTABLE ASPHALT PLANTS

High Production—Low Cost



**THE McCARTER IRON WORKS, INC.**  
NORRISTOWN, PENNA.

## MANUFACTURERS' LITERATURE

925

### Core Drilling Equipment

"Joy Core Drill Supplies and Equipment" is the title of a new catalog on auxiliary core drilling equipment issued by Joy Manufacturing Co., Henry W. Oliver Bldg., Pittsburgh 22, Pa. This 36-page catalog, Bulletin D-18, contains illustrations and specifications for a complete line of core barrels, bits, drill rods and other equipment necessary for diamond core drilling operations. When requesting bulletin please state type core drill on which equipment will be used.

926

### Rock Salt Usage

International Salt Company, Inc., has prepared a pamphlet outlining these and similar methods of rock salt storage that are now widely used throughout the northern states. The pamphlet, "How to Provide Low Cost Rock Salt Storage," also contains engineering data concerning the weight and bulk of rock salt loose and in bags, information about the proper construction of bin bottoms and similar data to guide commissioners in selecting suitable storage locations. Free copies may be obtained from company representatives or directly from the company in Scranton, Pa.

927

### Wood Preservatives

Chapman Chemical Co., 770 Derman Bldg., Memphis 3, Tenn., manufacturers of wood preservatives and insecticides, has issued a new folder on its line of chemical wood preservatives. Designed to give general information on several of their products, including Penta Preservative, Ambrocide, Permatox 10-S and Permatox WR, the bulletin has been printed in both English and Spanish.

928

### Application Engineering Data

With the publication of its Application Engineering Data on the "Parshall Flume and Weir Flow Recording Controller," The Foxboro Co., Foxboro, Mass., begins a series of service publications for contractors, public utility men, and engineers. Copies of the new publication will be promptly sent on request. The sets of Application Engineering Data are intended as practical tools for use in planning and estimating and in preparing specifications.

929

### Motor Grader

Illustrations and descriptions of many jobs performed by "Cat" motor graders are given in a new 16-page booklet published by Caterpillar Tractor Co., Peoria 6, Ill. Photographs of such operations as casting ditched material to the center of the road, mixing and spreading asphalt surfacing material, back sloping to get smooth banks that resist erosion, snow plowing, and ditching for better

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drainage accompany the descriptive stories.

930

### Earth Moving Equipment

A new 24-page book captioned "Euclid Loader for High Speed Loading of Large Hauling Units" issued by Euclid Road Machinery Co., Cleveland 17, O., contains a large number of operating views showing the loader at work on various jobs in this country and abroad. Included in the book are illustrations and descriptions of 10 features of the loader.

931

### Bulk Storage by Power Scraper

A new catalog describing the various techniques of storing and reclaiming bulk material by means of power drag scrapers has been issued by Sauerman Bros., Inc., 588 South Clinton St., Chicago 7, Ill. This 36-page booklet is one of a series that make up the 200-page sectional catalog covering the complete Sauerman line of scraper and cableway equipment. It contains nearly 100 illustrations alone of both unusual and conventional material-handling problems with explanations of their particular solutions.

932

### Money-Saving Lubrication Guide

Contractors and road equipment owners will find much money-saving data in Gulf Oil Corporation's new 3rd edition of its "Lubrication and Maintenance Guide for Contractors' Equipment." This manual, prepared with the close cooperation of equipment manufacturers, has chapters on engine lubrication, air cleaners, superchargers, oil filters, cooling systems, fuel injection pumps, valves, ignition, crawler mechanisms, and a score of other items. Over 90 pages of helpful data for your shop and field force.

Copies of the "Lubrication and Maintenance Guide for Contractors' Equipment" are available by writing Gulf Oil Corporation, 3800 Gulf Building, Pittsburgh 30, Pa., or nearest Gulf office or agent.

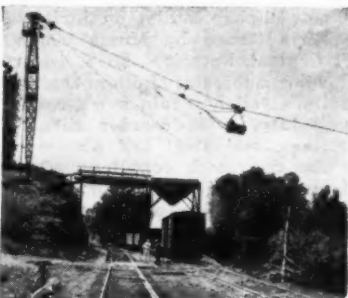
933

### Traffic Counter

A permanent station traffic counter installation, illustrated and described in a circular issued by Streeter-Amet Co., 4101 N. Ravenswood Ave., Chicago 13, Ill., is an electronically operated automatic recording traffic counter intended for use on highway locations where a continuous year around count of the vehicle traffic is desired. It consists of two basic units, namely, the Street-O-Matic and the recorder. The recorder is a combination of electrical and mechanical components by which an electrical signal pulse is converted into a permanent numerical record on paper tape. Time also is made a part of the printed record for purposes of correlating the signal pulses with given time intervals. The Street-O-Matic unit converts the signals received by traffic moving over the road coils into current pulses which actuate the mechanical unit of the recorder. Its two basic circuits consist of the transmitter or generator and the receiver or amplifier.



Sauerman Power Scraper operating a 3 cu. yd. Crescent bucket on a 700-ft. span, digs and hauls gravel from deep pit, feeding material to plant at rate of 60 tons per hour.



This Sauerman Slackline Cableway lifts gravel from river to car-loading hopper on bank; loads twelve cars a day.



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588 S. Clinton St., Chicago 7, Ill.

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## SAUERMAN MACHINE

Digging, hauling and dumping are combined in one continuous operation when you use a Sauerman Cableway or Power Scraper. Your equipment investment is less and you save on time and labor.

A Sauerman machine can be installed to reach across a pit, pond, river or stockpile or up to the top of a hill and will move material at high speed from one point to another anywhere within its wide radius of operation.

Sauerman machines are backed by 40 years of specialized experience in designing this type of equipment. Whether it is an installation to handle a hundred tons or many thousand tons per day, it will be efficient and economical and easily operated by one man.

Interesting catalog mailed on request.

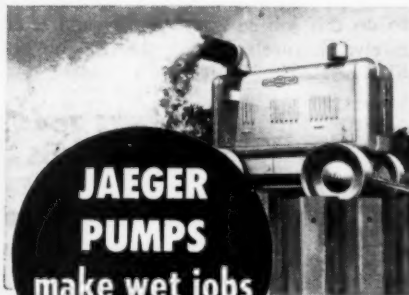
## The Lighthouse of the Highway EMBURY Traffic Gard The Warning Lantern with the SAFETY BEAM



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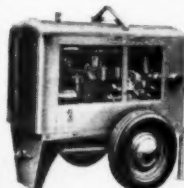
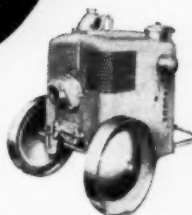


New 2" aluminum  
pump weighs 105 lbs.,  
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934

### Hard-Facing Alloys

A revised edition of the Stooddy Guide-book covering applications of hard-facing alloys in heavy industry recently published by Stooddy Co., Whittier, Calif., provides detailed information on the choice and application of various hard-facing metals commonly used in heavy construction, mining, cement, brick and clay plants, dredging, rock products plants and similar operations. Approximately 100 common uses for hard metals are described; data includes types of metals recommended, the method of application and the approximate amount of alloy required for the job in question.

935

### Flexible Chain Couplings

A new 16-page catalog on flexible chain couplings issued by Morse Chain Co., 7601 Central, Detroit 8, Mich., covers the following subjects: Roller chain stock couplings; silent chain stock couplings; heavy duty, made-to-order silent chain couplings, and steel and plastic covers for the two stock couplings. Complete information is given on dimension data, horsepower ratings, stock and maximum bores with many illustrations and useful descriptive matter.

936

### Pressure Regulators

A 32-page catalog covering its complete line of pressure regulators, announced by Air Reduction, 60 East 42nd St., New York 17, N.Y., includes regulators for welding, cutting, special flame processes, for administering anesthetic gases, for maintaining gaseous pressures in electrical equipment and other operations where controlled gas pressure is required. The catalog illustrates 26 regulators and describes over 100. There is a section covering regulator adapters and pressure gauges. Also, three pages are devoted to flow and pressure charts.

937

### Heavy Duty Equipment

A construction issue of "Production Road," announced by Twin Disc Clutch Co., Racine, Wis., is the third in a series of informal reports on various phases of the heavy-duty equipment industry. The new issue contains an informative account of the world's fifth largest concrete dam, at Hungry Horse, Montana, together with a photographic study of numerous types of construction equipment in which Twin Disc clutches and hydraulic drives are incorporated.

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**VERTICAL  
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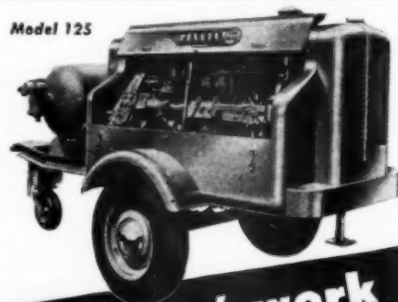
Now you can seal vertical and overhead joints with Premolded Para-lateral Sealing Strips, quickly, easily and economically. Para-Plastic Sealing Strips can be installed on finished concrete, or they may be attached to the form and concrete poured up to it. Premolded Para-Plastic Strips have the same cohesive, adhesive and resilient qualities as our widely known Hot-Poured PARA-PLASTIC rubberized asphalt joint sealing compound.



Write for complete details of this TIME and COST-**SAVING** watertight seal for those "tough" applications.

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Model 125



**4 days' work  
now done in 3**

with

**JAEGER**  
"new standard"  
compressors



Jaeger Model 125 runs 2 heavy duty or 3 medium breakers at full 90 lbs. pressure, doing 30% to 40% more work than at 70 lbs. pressure from a 105 ft. machine.

Other Jaeger "new standard" sizes, 75, 185, 250, 365, and 600 ft., give you comparable work increases. Cost no more than smaller old sizes. Send for Catalog and prices.

**THE JAEGER MACHINE CO.**  
Columbus 16, Ohio

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2. If you prefer, instead of mailing coupon, use business-reply card "A" inserted in this publication. Just fill in our code numbers on blank lines, tear out, and mail.

3. See also other inserted cards. Card "B" is for use in obtaining data on any products or literature advertised in this issue of *Road and Streets*.

4. Card "C" is for further information on any items described in the "New Equipment and Materials" or "Manufacturers' Literature" sections—see back part of magazine.

- 16-82 ☐ Acetylene apparatus
- 2-93 ☐ Additives, bit.
- 1-4 ☐ Aggregate plants
- 3-107 ☐ Air entrain. agents
- 16-162 ☐ Air cleaners
- 15-153 ☐ Air accessories
- 15-61 ☐ Air compressors
- 2-94 ☐ Asphalt
- 2-95 ☐ Asphalt emulsion
- 2-96 ☐ Asphalt flux oil
- 16-72 ☐ Augers, earth boring
- 7-161 ☐ Axles, truck
- 16-121 ☐ Back fillers
- 15-62 ☐ Backfill tampers
- 14-152 ☐ Backhoes
- 1-108 ☐ Batches, Weigh
- 1-90 ☐ Batch meters
- 16-163 ☐ Bearings
- 16-164 ☐ Belting
- 1-1 ☐ Bins, aggregate
- 2-97 ☐ Bit. cold patch mat.
- 2-8 ☐ Bit. distributors
- 2-7 ☐ Bituminous finishers
- 2-10 ☐ Bituminous heaters
- 2-98 ☐ Bituminous mixers
- 2-11 ☐ Bit. plants, central
- 2-12 ☐ Bit. plants, travel
- 2-99 ☐ Bituminous pumps
- 2-100 ☐ Bit. repair outfits
- 2-101 ☐ Bituminous tanks
- 16-16 ☐ Blades, grader, etc.
- 5-29 ☐ Blades, under-truck
- 16-165 ☐ Block and tackle
- 15-159 ☐ Blowers
- 16-166 ☐ Boilers
- 15-69 ☐ Breakers, pavement
- 16-167 ☐ Brooms, power
- 13-55 ☐ Buckets, concrete
- 13-54 ☐ Buckets, clamshell
- 13-56 ☐ Buckets, dragline
- 13-57 ☐ Buckets, orange peel
- 16-71 ☐ Buildings, portable
- 12-49 ☐ Bulldozers
- 16-148 ☐ Cableways, slackline
- 16-168 ☐ Calcium chloride
- 3-14 ☐ Carts, concrete
- 3-108 ☐ Cement, bulk plants
- 3-109 ☐ Cement guns
- 16-169 ☐ Chains, conveyor
- 16-170 ☐ Chains, ordinary
- 1-91 ☐ Classifiers, aggreg.
- 16-171 ☐ Cleaning compounds
- 16-172 ☐ Cleaners, steam
- 12-147 ☐ Clearing rakes
- 3-110 ☐ Concrete admixtures
- 3-13 ☐ Conc. batch plants
- 3-111 ☐ Conc. curb forming
- 3-112 ☐ Conc. curing matls.
- 3-15 ☐ Conc. finishing equip.
- 3-21 ☐ Concrete road forms
- 3-22 ☐ Concrete towers
- 3-114 ☐ Conc. joint seals
- 3-115 ☐ Conc. joint equip.
- 3-113 ☐ Conc. jt. maint. equip.
- 3-16 ☐ Concrete joint mater.
- 3-17 ☐ Conc. mix. und. 1-yd.
- 3-18 ☐ Conc. mix. 1 yd. up
- 3-23 ☐ Conc. mixers, truck
- 3-19 ☐ Concrete pavers
- 3-116 ☐ Conc. pumping equip.
- 3-117 ☐ Concrete tools
- 15-64 ☐ Concrete vibrators

- 3-118 ☐ Concrete saws
- 1-2 ☐ Conveyors and parts
- 4-24 ☐ Cranes, crawler
- 4-25 ☐ Cranes, rub. tired
- 4-127 ☐ Cranes, tractor
- 16-173 ☐ Cribbing
- 1-4 ☐ Crushing plants
- 1-3 ☐ Crushers
- 16-174 ☐ Culverts, metal
- 14-58 ☐ Dippers, shovel
- 14-175 ☐ Dipper teeth
- 3-119 ☐ Dowels, concrete
- 16-176 ☐ Drags and maintrs.
- ☐ Draglines (see other)
- 16-177 ☐ Dredge equipment
- 15-154 ☐ Drill bits and steel
- 15-65 ☐ Drills, cable tool
- 15-155 ☐ Drills, core
- 15-156 ☐ Drills, horizontal
- 15-67 ☐ Drills, rock, hand
- 15-66 ☐ Drills, wagon
- 15-157 ☐ Drill sharpeners
- 16-178 ☐ Drink. cups, dispens.
- 9-149 ☐ Drives, belt
- 7-129 ☐ Drives, tandem, truck
- 2-102 ☐ Dryers
- 7-130 ☐ Dump bodies, truck
- 7-36 ☐ Dump wagons
- 2-103 ☐ Dust collectors
- 9-43 ☐ Elect. mtrs., gen'tors
- 16-178 ☐ Elevators, bucket
- 9-142 ☐ Engines, air cooled
- 9-42 ☐ Engines, diesel
- 9-41 ☐ Engines, gasoline
- 9-143 ☐ Engine gener. sets
- 9-144 ☐ Engines, other
- ☐ Excavators
- (see Shovels)
- 16-179 ☐ Explosives, etc.
- 1-92 ☐ Feeders
- 21-87 ☐ Fence, hy. safety
- 21-180 ☐ Fence, snow
- 5-128 ☐ Finegraders
- 17-181 ☐ Fittings, wire rope
- 17-182 ☐ Flares
- 17-183 ☐ Flashers, truck
- 17-184 ☐ Flooring, steel
- 3-120 ☐ Formgraders, con. rd.
- 20-121 ☐ Forms; sewer, tunnel
- 21-122 ☐ Forms, bldg.
- 17-185 ☐ Gates, drainage
- 17-186 ☐ Gates, crossing
- 17-187 ☐ Gears
- 5-30 ☐ Graders, elevating
- 5-27 ☐ Graders, blade
- 17-188 ☐ Gratings
- 17-189 ☐ Grinders
- 1-93 ☐ Grizzlies
- 17-87 ☐ Guard rail and access.
- 17-190 ☐ Hammers, power
- 17-85 ☐ Hand tools
- 17-191 ☐ Hard facing mat'ls.
- 17-192 ☐ Harrows
- 2-104 ☐ Heaters, pav. surf.
- 17-193 ☐ Hoists, chain
- 17-86 ☐ Hoists, derrick type
- 17-194 ☐ Hoists, hand
- 17-195 ☐ Hoists, other
- 7-131 ☐ Hoists, truck body
- 17-196 ☐ Hoists, winch
- 15-197 ☐ Hose, air
- 2-105 ☐ Hose, asphalt, tar

- 17-198 ☐ Hose, steam
- 17-199 ☐ Hose, metallic flex.
- 17-200 ☐ Hose, suction
- 17-201 ☐ Hose fittings
- 18-84 ☐ Hydraul. con. equip.
- 18-201 ☐ Ignition equipment
- 18-202 ☐ Instruments, lab.
- 18-203 ☐ Instruments, draft.
- 18-204 ☐ Instruments, survey
- 18-83 ☐ Jacks
- 18-218 ☐ Lab., testing
- 18-219 ☐ Lanterns
- 18-220 ☐ Leaf collectors
- 19-73 ☐ Light plants
- 19-221 ☐ Lights, flood
- 19-222 ☐ Lighting, street
- 19-223 ☐ Linings, brake, etc.
- 6-32 ☐ Loaders, bucket, belt
- 6-31 ☐ Loaders, front-end
- 19-74 ☐ Lube equipment
- 19-224 ☐ Lubricants
- 18-205 ☐ Meters, parking
- ☐ Motors (Engines)
- 18-75 ☐ Mowers, highway
- 18-207 ☐ Mudjacking equip.
- 18-208 ☐ Oil filters
- 15-68 ☐ Paint sprayers
- 18-209 ☐ Paints
- 4-26 ☐ Pile driving equip.
- 18-210 ☐ Piling
- 18-211 ☐ Pipe, concrete
- 18-211 ☐ Pipe, corrugated
- 18-212 ☐ Pipe, other
- 18-213 ☐ Posts
- 18-214 ☐ Post drivers
- 12-50 ☐ Power take-offs
- 18-215 ☐ Presses, track
- 18-217 ☐ Presses, hydraulic
- 18-77 ☐ Pulverizers
- 8-38 ☐ Pumps, centrifugal
- 8-39 ☐ Pumps, diaphragm
- 8-40 ☐ Pumps, piston
- 8-136 ☐ Pumps, dredge
- 8-137 ☐ Pumps, gasoline
- 8-138 ☐ Pumps, grease, oil
- 8-139 ☐ Pumps, jetting
- 8-139 ☐ Pumps, mud
- 8-140 ☐ Pumps, sump
- 19-225 ☐ Radio intercommun.
- 19-226 ☐ Reflector. products
- 21-123 ☐ Reinforcing steel
- 12-51 ☐ Rippers, road
- 15-70 ☐ Riveting equipment
- 10-45 ☐ Rollers, pneu. tired
- 10-44 ☐ Rollers, steel

- 10-46 ☐ Rollers, tamping
- 10-145 ☐ Rollers, trench
- 10-146 ☐ Rollers, vibrating
- 19-227 ☐ Rust preventatives
- 19-228 ☐ Salt
- 19-76 ☐ Saws, chain
- 19-229 ☐ Saw rigs
- 19-230 ☐ Saws, power, hand
- 19-231 ☐ Scales, platform
- 1-124 ☐ Scales, weigh batch.
- 19-232 ☐ Scarifiers
- 19-233 ☐ Scarifier teeth
- 7-53 ☐ Scrapers, self-prop.
- 7-52 ☐ Scrapers, tractor
- 1-5 ☐ Screens, aggregate
- 14-58 ☐ Shovels, under 1 yd.
- 14-59 ☐ Shovels, 1 yd. up
- 14-150 ☐ Shovels, tractor
- 14-60 ☐ Shovels, rub. tired
- 19-234 ☐ Safety lights
- 19-235 ☐ Signals, traffic
- 19-236 ☐ Signs and materials
- 14-151 ☐ Skimmers
- 6-132 ☐ Snow loaders
- 19-88 ☐ Snow plows, rotary
- 19-89 ☐ Snow plows, displ.
- 19-78 ☐ Spreaders, sand
- 19-77 ☐ Stabiliz. equip.
- 20-237 ☐ Steel, structural
- 7-160 ☐ Steering equipment
- 20-79 ☐ Street flusher
- 20-80 ☐ Street sweeper
- 20-238 ☐ Tanks, truck
- 2-106 ☐ Tar, road
- ☐ Tar equipment (Bit.)
- 20-239 ☐ Tarpaulins
- 20-240 ☐ Tents, contractors'
- 20-241 ☐ Timber treated
- 20-242 ☐ Tires, off road
- 20-243 ☐ Tires, truck
- 20-244 ☐ Tools, shop
- 11-47 ☐ Tractors, crawler
- 11-48 ☐ Tractors, wheel
- 7-37 ☐ Trailers, flat bed
- 6-33 ☐ Trenchers
- 7-133 ☐ Trucks, all-wheel
- 7-34 ☐ Trucks, dump
- 7-35 ☐ Trucks, gen. service
- 7-259 ☐ Trucks, rock
- 7-244 ☐ Trucks, street clean.
- 7-158 ☐ Truck chassis
- 7-245 ☐ Tubing
- 8-141 ☐ Valves, pump
- 21-125 ☐ Vibrators, concrete
- 20-246 ☐ Vibrators, earth
- ☐ Wagons (Dumpwag.)
- 20-247 ☐ Weed burners
- 20-248 ☐ Weed chemicals
- 20-249 ☐ Welding appar., elec.
- 20-250 ☐ Welding appar., oxy.
- 20-251 ☐ Welding rods (see also Hard facing)
- 20-252 ☐ Wellpoint equipment
- 20-253 ☐ Wheels
- 20-254 ☐ Wire
- 20-255 ☐ Wire rope
- 20-256 ☐ Wire rope access.
- 20-257 ☐ Wood preservatives
- 20-258 ☐ Woodworking equip.

## Use This Coupon

Other products not named above, or specific variety of the products checked

Your name \_\_\_\_\_ Title or Profession \_\_\_\_\_

Name of your company \_\_\_\_\_  
or governmental dept. \_\_\_\_\_  
Type of work for which equipment will be used \_\_\_\_\_

Street Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ County \_\_\_\_\_



## WITH THE MANUFACTURERS & DISTRIBUTORS

### Hyster Promotes Morgan



J. W. Morgan

J. W. Morgan has been advanced to the position of assistant sales manager of the Hyster Co.'s eastern sales division. He will be in charge of tractor equipment sales activities and will be located at the Hyster Peoria, Ill., plant. His experience covers two years as Hyster district representative in addition to several office sales positions.

### New Richkraft Salesmen

The Richkraft Co., Chicago, Ill., manufacturers and distributors of reinforced, waterproof building papers, and road curing blankets, has announced the appointment of four new salesmen to cover the territories of Arizona, New Mexico and Texas. E. B. Randall with headquarters at Houston, Tex.; Dave Gibson, Sr., at Amarillo, Tex., and D. V. Livoni and C. H. Hays at Phoenix, Ariz.

### Carter Appointed Sales Representative



T. E. Carter

Thomas E. Carter has been appointed sales and service representative in the New England area for the D-A Lubricant Co., Inc., Indianapolis, Ind. He served in the U. S. Army for nearly three years as a diesel engine mechanic and supervisor of a diesel engine tractor shop. Following discharge he next became associated with a heavy-duty equipment company as a field representative and salesman. He will represent the company in the states of Maine, Massachusetts and Rhode Island.

### New Penflex Vice President

William Townsend, long associated with the Pennsylvania Flexible Metallic Tubing Co., Philadelphia, Pa., as sales manager, has been named vice president in charge of sales.

### I-H Engineering Changes

H. T. Reishus, general manager, International Harvester industrial power division, has announced a change in structure in the engineering department and the following appointments: W. O. Bechman, chief engineer, advanced engineer-

ing group; M. R. Bennett, chief engineer, products engineering group; H. V. Parsley, chief engineer, government engineering group; and J. W. Curley, chief engineer, experimental and test group. The reorganized functions of industrial power engineering will be under the direction of D. B. Baker, manager of engineering.

### Austin-Western to Distribute Sicard Plow

Austin-Western Co., Aurora, Ill., has announced an exclusive contract with Sicard, Incorporated—builders of the well-known Sicard Snow Master rotary plow. The contract establishes Austin-Western as the sole distributor of the Snow Master, when used as a grader attachment, in both the United States and Canada. Austin-Western power graders, with their All Wheel Drive and All Wheel Steer, Precision Side Shift, and Controlled Traction, can be converted in a few hours from their normal grading operations to use with the Sicard Snow Master.

### Maisch New Production Manager

Sterling G. Maisch has been appointed production manager of Eaton Manufacturing Co.'s Axle Division, Cleveland, O., to fill the vacancy created by the recent passing of Charles H. Hunt. This appointment was recently made by Stewart Walls, division factory manager. Since coming to Eaton in 1943 Maisch has been in the production department. His previous experience was in the production office of the West Steel Casting Co., Cleveland, and in the purchasing department of Standard Oil Co.



S. G. Maisch

### New Acrow Distributor

Minneapolis Equipment Co., 520 South East Second St., Minneapolis, Minn., has been appointed distributor for the state of Minnesota and 22 counties in the state of Wisconsin by Acrow, Inc., 420 Lexington, Ave., New York City, for its adjustable steel shores, adjustable steel trench jacks, column clamps, and adjustable steel scaffold stands.

### Airco Appointment

L. B. Dobbins has been appointed supervisor of plant engineering for Air Reduction Sales Co., New York, N. Y. He will administer plant engineering matters not assigned to the general engineering division. He will also act as liaison between Airco's operating and research and engineering departments on problems of a technical and engineering nature.

### New Stooddy Distributors

Stooddy Co., Whittier, Calif., has announced the addition of two new distributors for the entire line of Stooddy hard-facing alloys: Morris, Wheeler & Co., of Philadelphia, and Silver Welding

Supply Co. of Boston. Morris, Wheeler & Co. at Fox St. and Roberts Ave. will cover Eastern Pennsylvania and the states of New Jersey, Delaware, and Maryland. The area served by Silver Welding Supply Co. at 1758 Centre St., West Roxbury, Mass., is the Eastern half of Massachusetts.

### LeTourneau Reorganizes Service Department

Reorganization of the LeTourneau Service Department into eastern, central and western territories has been announced by the LeTourneau Co., Peoria, Ill. This new set-up aligns the functions of this department with those of the sales organization, thus assuring maximum service to LeTourneau distributors and the customers they serve. Cloyd W. Richards heads the department as general service manager. Pat Edwards is Eastern service manager; George Crafton, Central service manager, and Jack Lewis, Western service manager. The territories they supervise correspond to those designated as Eastern, Central and Western sales areas. All of the service managers headquarter at Peoria, and direct activities of service engineers assigned to their respective territories, and supervise handling of the service needs on all LeTourneau products in their areas. Clyde E. Clair has been named special service representative, with headquarters at Peoria. He will handle special service assignments.

### Worthington Promotes McArthur

John P. McArthur has been appointed Manager, West Coast Sales for Worthington Pump and Machinery Corporation, Harrison, N. J., with headquarters in San Francisco. He will supervise the activities of the Los Angeles, San Francisco, Seattle and Salt Lake City District Offices. Mr. McArthur joined Worthington in 1936 as an estimating engineer. He became a sales engineer two years later and in 1945 was made manager of the San Francisco District Office.

### Penn. Firm to Make Jaques Borer

Manufacturing rights for the Jaques hydraulically controlled earth boring machine, formerly produced by Jaques Co., Denison, Tex., have been purchased by the Johnson Engineering & Manufacturing Co., Gilligan St., Wilkes-Barre, Pa., who have now begun the production of the unit. The Jaques machine has been and will continue to be distributed by the Wyoming Valley Equipment Co., Forty Fort, Pa., whose distribution includes 22 states and the District of Columbia and all foreign countries excepting Mexico and Australia.

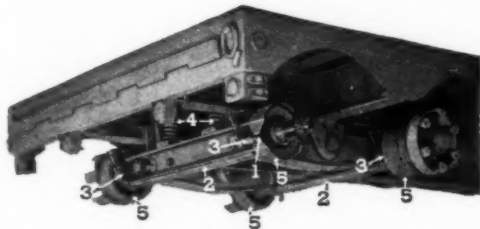
### U. S. Rubber Promotes Delehaunty

Matthew J. Delehaunty, heretofore salesman at Pittsburgh, Pa., has been named district sales manager for the Pittsburgh, Pa., branch of the mechanical goods division, United States Rubber Co., New York, N. Y. He succeeds J. W. Greenwalt who has retired from the company.



## BE SURE YOUR NEXT TRAILER HAS ALL THESE FEATURES:

Deep, wide flange main beams running the full length of the trailer, I-Beam sections for cross-members and outriggers, improved, fabricated gooseneck, and all electric-welded construction. Look at all the other features



found only on Jahn tandem axles: (1) constant lift cam, (2) two full-width axles attached to longitudinal rocker beams, (3) worm gear type slack adjusters at each wheel, (4) heavy coil springs at each axle and (5) positive equalizing braking at each wheel regardless of position of axle.

### C. R. JAHN COMPANY

Dept. 45

212 Main St.

Savanna, Ill.

Heavy duty trailers from 5 to 100 tons.



### New Worthington Sales Management Team

John J. Summersby has been elected vice president in charge of sales by the Board of Directors of Worthington Pump and Machinery Corporation, Harrison, N. J. Thomas J. Kehane was made assistant vice president and general sales manager.



J. T. Summersby

Mr. Summersby joined the Cincinnati Works of Worthington Pump and Machinery Corporation in 1916 as a student engineer. In 1919 he was assigned to the St. Paul district office as a salesman and

later was made district sales manager. He was manager Holyoke Works Sales from 1929 to 1931; assistant general sales manager from 1931 to 1934, and since, assistant vice president and general sales manager. Thomas Kehane joined Worthington in 1915 as a 14-year old office boy. Since then he has advanced through various positions in the sales department, and in 1944 was appointed commercial vice president, Pacific Coast. For the past two years he has served as Pacific Coast regional vice president of the Navy Industrial Association.

### Changes in Caterpillar Research Department

J. M. Davies, associate director of research at Caterpillar Tractor Co., Peoria, Ill., since 1945, has been named director of research, succeeding C. G. A. Rosen who is showing progress in recovery from a recent illness. The new director has been with the company since 1925 when he joined the firm at San Leandro, Calif., as a laboratory engineer.



J. M. Davies



L. A. Blanc



C. G. A. Rosen

Rosen, in an advisory capacity, will devote his time to the further development of Diesel engine design and performance and will aid in the advancement of the company's technical program. Rosen was Caterpillar's first director of research, the department being organized in 1942. Succeeding Davies is Dr. L. A. Blanc who has been assistant director of research, administering the activities of the physical, chemical and metallurgical division. The new associate director joined Caterpillar at San Leandro in the research organization in 1937.

### Air Reduction Personnel Changes

Sales personnel changes as follows for Air Reduction Sales Co., New York, N. Y.,

have been announced: J. B. Davenport, formerly assistant manager of the Detroit district, has been appointed assistant manager of the Charlotte district. J. H. Hart, formerly assistant sales manager at Detroit, has been promoted to assistant manager of the district. R. A. Jamieson succeeds Mr. Hart in Detroit. A. S. Blodget, Jr., has been appointed assistant manager of the Boston district.

### New Detroit Diesel Distributor

Diesel Equipment Co., Wichita, Kan., has been appointed exclusive distributors for General Motors Series 71 Diesel engines in central and western Kansas. The franchise covers industrial and petroleum engine sales as well as service in those counties west of and including Washington, Clay, Dickinson, Morris, Chose, Greenwood, Elk and Chautauqua.

## Shunk Snow Plow and Ice Removal BLADES

Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.

FOR ALL TYPES AND MODELS OF SNOW PLOWS  
Various widths, lengths, thicknesses—flat or curved—standard or special—punched ready to fit your machine.

### SHUNK SAW-TOOTH ICE BLADE

Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

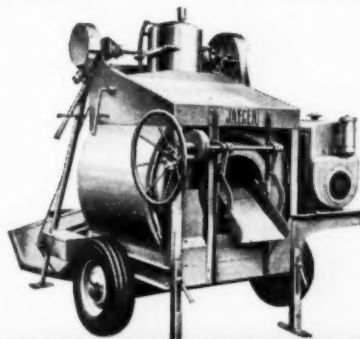


# Shunk

## MANUFACTURING COMPANY

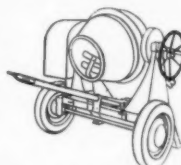
ESTABLISHED 1854  
BUCYRUS, OHIO.

## to cut the cost of your concrete work



## JAEGER BUILDS A BETTER MIXER

Improved mixing blade design, drum rollers on Timken bearings, advanced automotive transmission and drum gear protection—these are some of the features of Jaeger's latest SPEEDLINE mixers. Sizes 6S, 11S, 16S with famous Skip Shaker power loader; 3 1/2 S tilters and non-tilt types. Send for Catalog.



THE JAEGER MACHINE COMPANY  
Columbus 16, Ohio

**FOR SALE**

1. 1—Double Drum LeTourneau Sheepfoot Roller. Used less than thirty days... \$ 1,000.00
2. 1—Barnes road pump. Heavy duty; good for Concrete Work..... \$ 400.00
3. 1—Tournapull rubber-tired machine used six months; 15-cy. capacity, with Cummins Diesel Motor. Almost new \$10,000.00
4. 1—LeTourneau 15-yd. pan, tires 18" x 24". New 1946..... \$ 3,500.00
5. 1—HD-10 Allis-Chalmers Tractor with Baker Hydraulic bulldozer 10' blade. 1948 model..... \$ 8,000.00
6. 1—412 Adams Road Grader. late model 1946, pneumatic tires. Rear 1300 x 24. Front 700 x 24. International Diesel Motor..... \$ 4,000.00
7. 1—HD-14 Allis-Chalmers Bulldozer Double Drum Power take-off, 10' Hydraulic Backer Blade. Good for pan and bulldozing work..... \$ 9,000.00
8. 1—Jaeger Air Compressor on Pneumatic Tires. 105 cu. ft. with two paving breaking hammers..... \$ 2,000.00
9. 1—Ten-ton, 3-wheel Hercules Roller, 6 cylinder motor, Electric starter..... \$ 2,250.00
10. 1—Heavy-duty Osgood Combination Crane & Shovel equipped with 45-ft. boom, 1-yd. Blaw-Knox bucket also equipped with shovel front and dipper stick. Has new 90 hp GM diesel motor..... \$10,000.00
11. 1—No. 66 Caterpillar Pull Grader 12' blade, leaning wheels..... \$ 750.00
12. 1—Lot of Blaw-Knox combination curb and gutter forms also 1,000 feet of 5' sidewalk forms (the lot)..... \$ 1,000.00
13. 1—Gar Wood 15-yd. Pan. Purchased new March, 1948..... \$ 5,000.00
14. 1—45' Lattice Boom, Osgood..... \$ 500.00
15. 3—One-yd. Blaw-Knox Buckets.....ea. \$ 500.00
16. 1—Lot of pile driving rig, including 3,000-lb. hammer, cap and leads (for the lot)..... \$ 600.00
17. 1—Three-bag Ransome Mixer on four pneumatic tires, with scales and three pneumatic Tired Concrete Carts..... \$ 1,500.00

**WALLER PAVING COMPANY**  
Salisbury, Maryland  
Phone 7691

**FOR SALE**

- 1—Complete Pioneer washing and screening gravel plant, Model 305W.
- 1—"Caterpillar" D-4 with 1 yard Traxcavator.
- 1—"Caterpillar" 70 tractor with 12 yard scraper.

**R. M. Checkley Construction Co.**  
R.R. 1 Edwardsburg, Michigan  
Phone: 68-F-12

Lorain 1/2 yd. 30' B, Ser. #9132.....\$5500  
AC Bulldozer HD7W, Hyd. new 1946... 5000  
Austin Western 99W Grader, scarifier... 5500  
Gallon Grader, diesel scarifier..... 4500  
Chic. PG20, 105 cu. ft. trailer/mtd.... 1250  
CMC 10" cent. pump, Waukesha..... 1200  
Trail-O-Littleford 2 ton tandem..... 975  
Plymouth 7 ton, 36" gauge, gas..... 2000  
Plymouth 30 ton, Mod. MLB, 1943..... 12000  
Link Belt LS50, 30' boom, 1943..... 5500  
2—Lorain Motor Cranes, 1944 each..... 13500  
TD18, new Heil Angle Blade, 1000 hrs., 7500  
Wiley Mod. F, stiff leg derrick new.... 2900

Reconditioned—Late Model Equipment

**R. A. PARKINSON & SON**  
519 N. Delaware Ave.  
Philadelphia 23, Pa.

**FOR SALE**

- 7—Terra Cobra Scrapers, 150-HP Cummins engines. These machines new 1946-1947. Less than one year work. Latest improvements including cabs, 12-c.f. air compressors and 24-V generators, drive chains enclosed. All overhauled and appearance like new. Will sell in lot or separately.

All above subject to prior sale and F.O.B. St. Paul, Minn.

Terms can be arranged

Address

**R. M. Knox—B. S. Crooks**  
424 Endicott Bldg. St. Paul, Minn.

## FOR SALE

### MICHIGAN MODEL

## XT-6D TRUCK CRANE

Serial No. T435. With Williams Clam Bucket and Pull Shovel Attachment

**THIS IS A BARGAIN**  
**AT \$5,500**  
**EARLE EQUIPMENT CO.**

6331 Tireman Ave.  
Detroit 4, Michigan  
Phone Texas 4-2100

**FOR SALE**

- 1 Rex 16-S Mixer, Serial HB-382, mounted on 4 Pneumatic Tired Wheels, powered with Wisconsin 4 cyl. engine, Model VF4, Serial 1021797.
  - 2 Rex 2" 10M Pumps, Serial BT1570 and BT1587, mounted on 2 Pneumatic Tired Wheels, powered with Wisconsin 1 cyl. AE engines.
  - 1 Durex No. 5 Saw Rig, Serial S-927, powered with VE4 Wisconsin Gasoline Engine, Serial 1032316.
  - 1 Rex 10-S Mixer, Serial K9489, mounted on 4 Steel Wheels, powered with LeRoi Engine, Serial 87995.
  - 3,000 sq. ft. Armco Black Steel Interlocking Sheeting.
  - 1 Winslow Type G Wheelbarrow Scale.
  - 1 Gar-Bro 1 cu. yd. Concrete Bucket, Type No. 433, Serial 5733.
  - 2 Gar-Bro Concrete Buggies mounted on Pneumatic Tired Wheels.
  - 1 Model 23B Gasoline Concrete Vibrator, powered with 3 h.p. Gas Motor.
  - 1 Chrysler 4" Pump, Serial 11799, mounted on a 2 Pneumatic Tired John Deere Wagon, Serial 1652 and powered with Chrysler Engine, Serial 104-7936.
  - Pneumatic Tired Concrete Wheelbarrows.
- WM. H. GILLILAND**  
Route No. 2, Alpena, Michigan

**FOR SALE**

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Mack chain drive dump trucks, preferably rock type dump bodies. Will take single axle drive or Tandem drive, or a six wheeler. Grasso Construction Co., P. O. Box 6086, Bridgeport, Connecticut.

1 #12 Caterpillar motor grader \$7,000  
#K1100, good condition  
1 D8 Caterpillar Tractor with PCU \$6,500  
1H2873, good condition  
1 D8 Caterpillar Tractor 2U2950 with Cat. PCU, Dozer and Le Tourneau scraper. Very good condition and about 2000 hrs. \$14,000

LEWIS SHAW

Decatur, Ill.

Phones 26213-27172

### MUST SELL!

#### CONTRACTORS' LIQUIDATION

Rex 34-E double drum crawler type paver. Waukesha gasoline engine. New in 1946. Excellent shape. \$8500.

Fuller Kinyon Type C. portable cement pump. Pneumatic tires. Electric powered 220/440 volts with control panel. \$1500.

60 KW General Motors portable diesel generator set 6 cylinder, 3/60/220, 1200 RPM, radiator and base. Excellent. \$2250.

MISSISSIPPI VALLEY EQUIPMENT CO.

515 Locust St. St. Louis 1, Mo.

### FOR SALE

50KW—CATERPILLAR—75KW

Diesel Electric Sets

"AS IS" or CATERPILLAR

"Remanufactured" guarantee

\$2,000 to \$7,000

Totally enclosed sets available

Other sizes from 10KW to 1000KW

Rentals—Sales

EVERSON SUPPLY COMPANY

15712 S. Leahy Ave., Bellflower, Calif.  
Phone Torrey 7-3514

### FOR SALE

Concrete Paving Spreader  
Finishing Machine. 34-E Foote  
Paver Form Graders, Sub-  
Grader. L-40 Lorain Dragline  
and Backhoe. D-4 endloader,  
No. 12 Auto Patrol. Road  
Forms, etc.

R. L. COLLIGNON

DAVENPORT, IOWA

### FOR SALE

1—Used D-7 Caterpillar Tractor—equipped with Double-Drum PCU and LeTourneau Cable Blade—Serial No. 7M-5606

2—Used 18-Yd. (TCN) Wooldridge Scrapers  
Serial No. 1075. Serial No. 1090

1—Used Allis-Chalmers Model H.D. 10 Dozer  
Serial No. 7051

Note: All equipment in excellent condition

CHICAGO HEIGHTS COAL CO.

27 E. 19th PLACE

CHICAGO HEIGHTS, ILL.

TEL.: CHICAGO HEIGHTS 90

## CLEARING HOUSE

### FOR SALE

D7 Caterpillar, Serial #7M3257, straight bulldozer blade, completely rebuilt, new tracks and rollers.

D7 Caterpillar, Serial #3T1642, cable operated, angled dozer.

D7 Caterpillar, Serial #6T1005, cable operated bulldozer blade.

D7 Caterpillar, Serial #3T774, straight bulldozer blade, completely rebuilt and motor thoroughly overhauled, equal to a new machine.

Model 35 Cletrac, unused, no blade, in excellent condition.

DDH Cletrac Tractor, hydraulic angle-dozer, Serial #1L6300, completely rebuilt from top to bottom.

37B Bucyrus-Erie Shovel, 1-1/2 yard, diesel engine, has been rebuilt and is in excellent condition. Necessary attachments available to convert into dragline.

Model 25 Bay City, Serial #2089, 1/2 yard, excellent condition, new Buda Diesel Engine.

Osgood Serial #2942, 1-3/4 yd. shovel and dragline. Has been completely rebuilt and will guarantee.

Model 83 Byers, Serial #848, 3/4 yard shovel, good condition.

209 Osgood Shovel, Serial #3137, 1/2 yard. Will sell as shovel or shovel and backhoe combination.

All above equipment is in first class condition

W. N. DIPPLE

Cranberry Road  
P. O. Box 313

Hazleton, Pa.  
Hazleton 3019

### FOR SALE

Four (4) Used Super "C" Tournapulls. Excellent Condition.

One (1) Used Bucyrus-Erie Model 22-B, Crane-Dragline.

One (1) Used Link-Belt Model LS-85, Crane-Dragline.

One (1) Used Chicago Pneumatic 315-cubic foot Portable Air Compressor.

Used Motor Graders, all sizes and makes

FEHRS TRACTOR  
& EQUIPMENT CO.

1809-11 CUMING STREET  
OMAHA 2, NEBRASKA

### FOR SALE

1—KR11 Int'l. truck and 3 yard Rex Mixer. Engine rebuilt, repainted—\$3500.00.

6—KR11 trucks for Mixers, 1944-1948. Price \$2000.00-\$4000.00.

3—Int'l. 2000 gallon, 3 axle water or oil tankers—\$1000.00 each.

1—LowBoy trailer, 8-8.25x15 tires, practically new, \$2500.00.

BERMAN SALES CO.

R.D. #1, PENNSBURG, PA.  
PHONE PENNSBURG 521

### FOR SALE

Steel thru girder bridge; 75 foot span, approx. 24 foot roadway, weight approx. 100 tons in very good condition.

DAVID M. DEANS

WILLIAMSTOWN, MASS.



## 1,000,000's of G.I.

### TRUCK PARTS

Every part for every type military vehicles. One of the most complete stocks in America.

Front axles, complete; front axle shafts, rear axle shafts, axle housing, differential assemblies, transmission assemblies, rear end assemblies, drive shafts, universal joints, pillow blocks, ring gears and pinions, oil seals and retainers, radiators, radiator hose, brake lining, hubs and drums, transfer cases, complete, transfer case seals, transfer case parts, all motor parts, cylinder heads, pistons, pins, rings, crankshafts, bearings, overhaul gasket sets, oil filters, cartridges, starters, generators, fuel pumps, voltage regulator, carburetors, fan belts, wheels, clutch pressure plate assemblies, clutch plates, front and rear springs, steering assemblies.

### MAIL ORDERS FILLED

Write—Phone—Come in

## WILENSKY

**AUTO PARTS CO.**  
1226-28 Washington Ave. N  
AT 4438 NE 3758  
Minneapolis, Minn.

### FOR SALE CONCRETE MIX TRUCKS

- 1—2 yd. Jaeger mounted on 2-3 ton Mack trk. Serial EH1S1182 New paint and ready for service. Price \$2,000.00.
- 1—2½ yd. Rex mounted on D40 Int. Trk. Serial DS408476. New paint and good running condition. Price \$2,500.00.
- 1—C.M.C. 30 ton hopper with 42 cu. ft. weigh batcher used 3 months. Price \$1,500.00.
- 1—New model 19B concrete vibrator. Serial 624212 Briggs & Stratton gas motor with 24 ft. vibrating shaft complete used ½ hr. Price \$200.00.

Write:

**ABBOTT & BYERS CONTR'S.**

518 Monroe Ave. Evansville, Ind.  
Phone 4-2391 ask for Byers

### FOR SALE

One Caterpillar Elevating Grader. Late model. Good condition. Six cylinder diesel motor. 48" machine. Price \$4500.00.

**BILL CURPHY CO.**

447 Insurance Exchange Bldg.  
Des Moines, Iowa  
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### DEPENDABLE USED MACHINES

Link Belt 2½ yd. dragline.  
Byers 83 dragline.  
Butler Carscoop.  
American 10" elec. sump pump.  
I-4 with Hough loader.  
Vulcan 3000 lb. drop hammer.

**TRACTOR & EQUIPMENT CO.**

3521 W. 51st St., Chicago 32

### WANTED

Single or Double Pumpcrete with pipe, bends, and accessories. Must be A-1 condition. Quote bottom price.

**ROBERT R. ANDERSON COMPANY**  
4550 West Patterson Avenue  
Chicago 41, Illinois  
Phone—SPring 7-2323

### FOR SALE OR RENT:

2½ T Brockway Tractor & 10 Ton capacity flatbed semi-trailer. Rubber like new. Cheap price.

Athey Mobiloader on Cat D-8 Postwar 8R series less than 1000 hrs. operation. Priced to sell.

Traxcavator on D-7 Cat, Flat treads, 2½ yd. bucket. Less than 1000 hrs. operation. Priced to sell.

Model 45 Bay City, Shovel, Backhoe, Crane, Dragline Combination. Good buy.

IHC TD-18 Tractor equipped with Isaacson Hydraulic dozer. 1947 Model. Excellent condition.

All types construction equipment for Rent.

Call Doug Howe

### FINGER LAKES EQUIPMENT CORPORATION

100 Greenway Avenue  
Syracuse, New York  
Phone: Syracuse 9-6605

### READY MIXED CONCRETE PLANT

1—Complete READY MIXED CONCRETE PLANT—Blaw Knox. Including the following: 800 barrel bulk cement bin, 100 ton per hour bucket elevator with unloading screw for handling bulk cement; Model 84-S Ransome Mixer (less than 2 years old); 100 ton three compartment aggregate bin complete with cement and aggregate weighing batchers; electric powered gantry and whirley for charging bins, with 2 cu. yd. Clamshell Bucket. Plant in daily operation and can be inspected in the Philadelphia district. Available on or before September 1, 1949. Offered subject to prior sale or commitment.

### FURNIVAL MACHINERY CO.

54th & Lancaster Ave., Phila. 31, Pa.

### FOR SALE

1—"Caterpillar" D-4 with Trackson-Highlift, 1 yd. bucket.

1—"Caterpillar" tandem motor grader.

1—Allis-Chalmers Model 42 motor grader.

2—Galion I-30 motor graders.

1—Pettibone-Mulliken ½ yd. clamshell.

1—Butler carscoop and unloading platform. Used 451 hrs.

### COX BROS.

Dixie Highway Phone 5104  
Hoopeston, Illinois

### FOR SALE

1—"CATERPILLAR" Diesel D4 tractor, with LaPlant-Choate straight hydraulic dozer, rebuilt and guaranteed.

1—CHICAGO PNEUMATIC Model 315 Diesel compressor on four pneumatic tires, used very little, available at considerable saving.

1—"CATERPILLAR" No. 70 Scraper. Used very little. Like new. Very reasonable.

**CASSELLINI-VENABLE CORPORATION**  
Barre, Vermont  
Telephone: Barre 90

### Emmett C. Watson CONTRACTORS' EQUIPMENT

Cedarapids portable crushing plant .....\$15,000.00  
Littleford Trail-O-Type distributor .....\$1,200.00  
Lorain Model 55 dragline, 1 cu. yd., S/N 5027 .....\$7,500.00  
Lorain Truck Crane. Waukesha gas engine, 80' boom, 15' jib; S/N 15447 .....\$19,000.00  
Lorain Truck Crane. Waukesha gas engine, 80' boom, 15' jib; S/N 11502 .....\$15,000.00  
Marion 1½ cu. yd. shovel equipped with D-13000 "Caterpillar" Diesel engine .....\$15,000.00  
Michigan Model C-16 trenchhoe & dragline, S/N 3243. Price on application.  
Northwest Model 8 dragline, 3 cu. yd., S/N 6254 .....\$28,350.00  
P & H Model 855 dragline, 3 cu. yd. ....\$29,925.00  
P & H electric welder, 300 amp., trailer mtd. ....\$800.00  
"Subject to Prior Sale"  
"Condition—Excellent"

310 E. Brandeis St., Louisville 6, Ky.  
Phone: Calhoun 5373  
SALES — SERVICE

## BARGAINS IN STOCK

A.C. Patrol—Model I.F. 14" Mouldboard. Cab—Leaning Wheel—Lights—Late Model. Just completely overhauled and like new. \$3,500.00.

Two—New Trojan Utility Speed Patrols, Equipped with Cab—Lights—Leaning Wheels. 12" Mouldboards—Will sell at our cost.

New Lessmann Power Shovels—¾ Yard capacity—Heavy Duty—Large Tires, 100 H.P. Ford Motors—½ Price.  
One—Slightly Used—Trojan Patrol. Cab—Lights, 12" Mouldboard—\$2,000.00.

### TRI-STATE EQUIPMENT CO., INC.

541 Lumber Exchange, Minneapolis  
Phone MAin 3643

### Structural Steel

#### For Sale

#### Plain and Fabricated

Stocks cover complete range for all building purposes and highway bridge work. Angles, Channels, Standard & Wide Flange Beams 6" to 16"—Lengths 40' to 60' 0".

#### Special Items

50 tons 18" — 54.7 lb. beams 40' — 48'  
25 " 20" — 65.4 lb. " 40' — 50'  
25 " 21" — 62 lb. " 50' — 60'  
50 " 24" — 76 lb. " 50' — 60'  
25 " 27" — 94 lb. " 50' — 60'  
25 " 30" — 108 lb. " 60' 0"

#### Rails ASCE Section

16 lb. — 20 lb. — 25 lb. — 30 lb. — 44 lb. — 50 lb. — 60 lb. — 70 lb.

#### Ship Channels

6" — 12 lb. — 15.3 lb. — 18 lb. — 15.1 lb. — 16.3 lb.  
8" — 18.7 lb. — 22.8 lb.  
9" — 25.4 lb.  
10" — 21.9 lb. — 25.3 lb. — 41.1 lb.  
12" — 32.9 lb. — 40 lb.  
13" — 31.8 lb.  
18" — 42.7 lb. — 45.8 lb. — 58 lb.  
Lengths 40' to 60'

Your Steel Inquiries Solicited

### PENNA. STEEL PRODUCTS

906 CITY CENTRE BLDG.  
PHILA. 7, PA. LOCUST 4-1898

## FOR SALE DW-10 TRACTORS

- 4 DW-10 tractors with Athey side dump wagons new in 1946  
3 DW-10 tractors with bottom dump wagons slightly older.

Inquire:

JOHN ARBORIO, Inc.

Poughkeepsie, N.Y.

### PAVERS

2—REX Model 34E Dual Drum Pavers. Model Duomatic, Powered with 6 Cylinder Gasoline Engine, Rex Mechanical Man, Batchmeter, 35' distributing Boom. Serial Nos. GG-165 and GG-126.

**FURNIVAL MACHINERY CO.**  
54th & Lancaster Ave., Phila. 31, Pa.

### FOR SALE

2—Austin-Western Patrol Sweepers

*Priced for Immediate Shipment*

Completely overhauled with Genuine A-W. Parts, New Brooms, Tires, Batteries, New Chains, Lights, Seats.

*Motors Completely Overhauled  
Sweepers Cleaned and Painted  
Can Be Inspected and Operated at*

**HILLSMAN EQUIPMENT CO.**  
2000 N. Hawthorne St.  
Ph. 460 MELROSE PARK, ILL.

### FOR SALE

- 1 Allis-Chalmers Model UC Tractor with Ottawa Industrial loader.....\$1,900.00  
1 Allis-Chalmers Model HD10W with Buckeye Cable dozer.....Priced to Sell.  
1 "Caterpillar" D4 with hydraulic bulldozer, good cond.....\$3,900.00

**DUNMIRE EQUIPMENT CO.**  
Phone 300 El Paso, Illinois

### FOR SALE

1—No. 6 Price seven stage Turbine deep well pump. Direct connected 10 h.p. motor.

**KLATZKY BROTHERS, INC.**  
P. O. Box 295 Newberry, Michigan

### "WANTED"

**HYSTER TOWING WINCHES**  
Models D8N-D7N

Write Box 1020, Roads and Streets  
22 W. Maple St.  
Chicago 10, Illinois

### DEMONSTRATOR

¾ yd. truck Crane  
**LITTLE GIANT**

Mounted on army 6x6½ cab; new Factory Guarantee. Price \$7,500.

Complete as Crane; 25 ft. Boom including Fairlead.

**PAUL M. COLE CO.**  
Central 6-1080  
30 N. LaSalle St. Chicago, Ill.

### INVENTORY CLEARANCE NEW MACHINERY GET OUR PRICES

#### SHOVELS—

- ¾ yard Osgood Shovel  
½ yard Osgood Shovel with Backhoe  
¾ yard General Shovel  
¾ yard Buckeye Shovel with 40' Craneboom (like new)

#### BLACKTOP MACHINES—

Adnun Paver  
Miller Spreader

#### AIR COMPRESSOR—

315 Gardner-Denver with Diesel Engine

#### MIXER—

11S Smith, 2 bag

**R. B. WING & SON CORP.**

384 Broadway • Albany, New York  
Phone 3-4161

### FOR SALE

Two Quick-Way cranes, Model E unmounted \$1,500.00 each. Two Quick-Way cranes on Coleman trucks \$2,750.00 and \$3,750.00. One Quick-Way crane on GMC 6 x 6 for \$3,650.00. One P&H half yard power shovel, Model 150-V 8 motor for \$2,000.00. One Bay City half yard drag line, excellent condition. All the above equipment is located in Milwaukee. One D 6 Caterpillar—R series with L.P. angle dozer, excellent condition, price \$4,500.00. One TD 14 with BE straight blade, price \$3,500.00. This equipment is located in Ohio.

**H. R. DOUGLAS**

1133 No. 35th ST., MILWAUKEE, WIS.

### New Guaranteed . . . 60 Ton Hydraulic Jacks

Navy Surplus **60% off**

**Berkeley Distributors, Inc.**

WATSON-STILLMAN (Mfg.)  
14 JOHNSON AVE., HACKENSACK, N. J.

#### WE HAVE FOR SALE—

The Following Steel Tanks

- 1—9' x 6' tank  
2—9' x 8' tanks  
1—10' x 7' tank

Two water tanks—5' x 16'

These tanks would make ideal sand or gravel hoppers.

**KLATZKY BROTHERS, INC.**  
P. O. Box 295 Newberry, Michigan

## For Sale

1 DS Cat No. 2U1685 With Cat Angledozer, front and rear Cat power Units.

1 LP 12 to 15 yd. LeTourneau Scraper.

1 Heavy LeTourneau Ripper.

1 Ford F8 tractor 159" wheelbase.

1 LaCrosse 24 ton low bed Trailer.

All of this equipment is in very good condition.

1 P&H 1-yd. Shovel in fair working condition.

**LEDAHL COAL CO.**

Williston, N. D.

### FOR SALE

1. Nelson Loader—Used—Gas or electric motor can be used—Good condition—on caterpillar \$500.00
  2. Forty foot Besser Mixer with motor and extra large new gear \$600.00
  3. Twenty-eight foot Stearns Mixer with motor and extra new large wheel \$450.00
  4. Three Mercury platform trucks like new—Gas and Electric generator \$2000.00 for the three or \$800.00 each
  5. One Electric platform lift truck—five-ton capacity with charger—no batteries—like new \$800.00
  6. One Bag Cleaner \$75.00
- F.O.B. Our Block Plant Rochester, N. Y.  
**SCHAEFER BROS. BUILDERS SUPPLY CO., INC.**  
1025 Chili Ave. Rochester 11, N. Y.

### PRICES REDUCED

- 2—AC HD-19 DOZERS  
1—INT. TD-18 BE DOZERS  
3—Osgood ½ c. y. shovels  
1—Lorain #2, 2 c. y. D-17000  
1—Insley K-14 Dragline  
1—PEH 150 Trench Hoe (New)

Send for complete bargain list of

GUARANTEED EQUIPMENT

RENTALS WITH PURCHASE OPTION

**CENTRAL  
CONTRACTORS SERVICE, INC.**

1150 N. North Branch

Chicago 22

### HERE IS A BUY!

New Unit ½ yard dragline with Page bucket. looks to prove machine has moved exactly 8620 yards to July 30, 1949. Purchased March, 1949, purpose shoveling mine tailings to recover zinc ore. Low metal market cause for sale. Also 2 new International K 7 dump trucks. If you want to see new equipment, here it is. Have road grader and SKW—110-220 volt alternating light plant, excellent condition. George M. Baker, Shullsburg, Wis.

### FOR SALE

2—LITTLEFORD, 165 gallon heaters and kettles. Has motor spray attachments, thermometers and barrel hoists. One used only six hours.

**DUNN COAL CO.**

Box 664

Decatur, Illinois

### FOR SALE

Approximately 3000 ft. of "Metaform" curb forms—10 ft. lengths, 13½ in. high. Complete with two stake boxes and two 24 in. steel stakes per 10 ft. length. Excellent condition.

**T. F. CLOGHESY, INC.**

739 Logan St. Hammond, Ind.  
Phone: Sheffield 6860



## CLEARING HOUSE

107

### FOR SALE

HD-19 Allis-Chalmers Tractor. Gar Wood Angle Dozer. Used 400 hrs. Bargain.  
HD-10 Allis-Chalmers with Baker dozer. A real Buy at \$5,500.  
D-6 "Caterpillar" with dozer and Winch. Used 800 hrs.

### JIM FOSTER

310 W. Elm Canton, Illinois  
Phone 2147

### FOR SALE

1 K8 Intl. 10:00 rubber, air & vacuum brakes with 24 ton flat bed low-boy with winch. All in A-1 condition. A steal at \$3,800.  
1 Cat #10 Patrol, Diesel. Excellent condition.  
1 Sixty Cat in good operating condition.

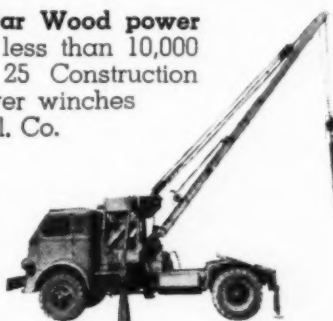
PAULSON BROTHERS  
Walker, Minn.

This late Autocar 5-Ton Tractor with Gar Wood power swing hoist and telescopic boom. Run less than 10,000 miles; equal to new; will sacrifice. 25 Construction Trucks, Fords and Brockways, with power winches formerly used by New England Tel. & Tel. Co.

These derricks and utility bodies and all equipped. Prices range from \$400.00-\$750.00.

### WARREN E. McCARTHY, INC.

241 Mystic Ave.  
Medford, Mass. MY 6-7346



### Autocar Diesel Tractors

All in perfect operating condition  
Model DC-100-T with HB-600 Cummins Diesel engines, aux. transmission, 11:00 x 24 tires, 36" Fruehauf 5th wheel. Choice of 50 units, 1944-1948. Priced from \$3,000 to \$7,000. Also one Mack and five GMC Diesels. All in perfect operating condition.

Call or Write  
GEORGE YOUNG

ROGERS CARTAGE CO.  
1934 Wentworth Ave. Chicago, Ill.  
Phone: CAumet 5-1213

### For Sale or Rent POWER SHOVELS

Lima, Model 34, 3/4 yd. crane, 40' boom, fair-lead, 3/4 yd. Hendrix Drag Bucket. Gasoline motor. Lighting system. Long crawlers, 30" shoes. Excellent Condition. 3 years old.

Bay City, Model 45, 3/4 yd. Gasoline. Counterweight. Wide crawlers. New Shovel Front. 40' crane boom with Rudomatic Tagline Winder. 1 yd. Hendrix Drag Bucket. Also Back Hoe. One year old, used about 6 months. Will sell with one attachment or all.

### E. VINCENT DeZETTER

Prattsburg, N. Y. Phone 3230 or 3210

### GOOD USED CONCRETE EQUIPMENT FOR SALE

1 CMC 16S 3 Bag Mixer, four wheels with pneumatic tires.  
1 CMC 11S 2 Bag Mixer, two wheels with pneumatic tires.  
4 inch Rex pump—Ingersoll Diesel Compressor Model HK-210.  
Worthington Compressor 105.

All Equipment in excellent condition.

Hinkle Contracting Co.  
Paris, Kentucky

### FOR SALE SURPLUS EQUIPMENT

10 All's Chalmers, HD10 tractors, like new.  
5 Buckeye Shovel cranes, Model 70.  
5 P & H model 255A and 155A.  
1 MC4 Lorain truck crane.  
1 MC3 Lorain truck crane.  
1 D7 Cat. dozers.  
3 Case rubber tire farm tractors.  
3 Lima paymaster, 3/4-yard combination shovel and crane.

For prices, etc., please write to

### FRANK TESTA

925 Citizens Bldg., Cleveland 14, Ohio  
or telephone TOWER—1-0558—1-0559

### FOR SALE OR RENT

1-Bucyrus-Erie Shovel B22. New 1947. Condition perfect.  
1-Gardner-Denver Wagon Drill. New 1948. Condition perfect.  
1-Generating Plant Kato 50 K.W., powered by P. D. 80 Int'l. Diesel, mounted on rubber.  
1-3/4 yard Amco Bucket to fit Speeder Shovel, Model L. S. 85.  
1-16" Gilson Pulverizer with Bucket Loader.  
1-Semi-Trailer with 8 to 10 yd. St. Paul Box 14'. Round front, practically new.

Price to sell on all above items.  
Can be seen at Caledonia, Minn.

Hector Construction Co. Inc.  
Box 107, Caledonia, Minn.

### FOR SALE

1 Steel Stack—Excellent Condition. 3 Sections 32' long, 40" ID by 1/4" walls. Breaching opening 46" x 32"

### UNION BAG & PAPER CORP.

1400 E. State St. Trenton, N. J.  
Attention: Mr. E. E. Gaus

### FOR SALE

Model B3 Link-Belt Speeder 1/2-yard combination shovel, dragline and clamshell, complete with 4-cyl. Hercules gas engine, 1/2-yard dragline bucket. Good working order. \$2800.00. F.O.B. Grand Forks, N.D.

### ROBERT J. WYLIE CO.

612 Pioneer Bldg. St. Paul 1, Minnesota

### FOR SALE

1—N. W. Shovel, 2 1/2 c.y., new Oct. 1946  
1—N. W. Shovel, 1 1/2 c.y., new April 1946  
1—P & H Dragline, 1 1/2 c.y., new June 1948  
1—N. W. Shovel, 3/4 c.y., Diesel, Backhoe—40' Crane, Dragline, new Aug. 1948  
1—Allis Chalmers Tractor Model HD19H, new May 1948  
5—D W 10's—used 2500 hours  
1—Caterpillar Auto Patrol #12—9K4626  
1—Caterpillar D8 Angledozer #8R8933  
1—Caterpillar D7 Bulldozer 4T5988  
Williams Construction Co.  
Box 145, Middle River, Baltimore 20, Md.  
Phone: Essex 1310

### FOR SALE

#### Each Unit Overhauled

K-55 Link Belt Electric Shovel  
2 yd. Shovel & Dragline Front  
37 Marion 1 3/4 yd. Steam Shovel  
5' Dia. x 8' Air Swept Tube Mill  
Complete with Motors, Fans & Pipe

### EASTERN ROCK PRODUCTS, INC.

404 Court Street  
Utica, N. Y.

### FOR SALE

2—T15 Browning Truck Cranes, 15 ton capacity, 90 foot boom on each. 7 1/2 KW generator on one with 39" Ding magnet. Excellent Condition. Available Now.

2—Industrial 30 Ton Locomotive Cranes.  
1 Available for Immediate Delivery.  
Equipped for Magnet Operation.

### W. E. PHILLIPS EQUIPMENT

Oregon 1400  
7279 Artesian Ave., Detroit, Mich.

## STRUCTURAL STEEL OF 6 STORY LOFT 75 x 80

Mostly 10" Bethlehem Beams

23 1/2 #, - 15' 6"

Also various sizes of  
Steam & Sprinkler Pipe

Being dismantled by

### ALBERT A. VOLK CO.

1819 B'way, N. Y. City  
Phone COL 5-7800

### FOR SALE

Sauerman 90 ft. high Steel Mast. Used in connection with 1 1/2 cu. yd. Slackline cableway. Good condition, purchased new and used less than 2 years.  
Can be seen at our Michigan City, Indiana plant.

PORTAGE-MANLEY SAND COMPANY  
Portage, Wisconsin



## EQUIPMENT BARGAINS FOR QUICK SALE

- 8—EUCLID 25FDT Bottom Dump Wagons
- 1—EUCLID 58V Loader  
(Will also consider long term rental on above)
- 4—EUCLID KGT Bottom Dump Wagons
- 1—1948 UNIT 1020, ¾ yard combination Shovel & Backhoe  
(new machine guarantee)
- 1—1947 BYERS 71 ½ cu. yd. Shovel & Hoe
- 1—1948 INSLEY K12 ½ cu. yd. Shovel & Hoe
- 1—1949 LORAIN TL-20 Hoe
- 1—MARION 93 M Shovel New Aug. 1947
- 1—CEMCO 24" x 40" Portable Conveyor, new
- 1—WILLIAMS ¾ yd. MF Multiple Rope Clamshell Bucket
- 1—WILLIAMS 1 yd. MF Multiple Rope Clamshell Bucket
- 2—OWEN Type K 1¼ yd. clamshell buckets (slightly used)
- 2—¾ yd. PETTIBONE-MULLIKEN Shovel Dippers with padlock, new
- 5—¾ yd. QUICKWAY Dragline Buckets, new
- 1—SULLIVAN 105 Air Compressor, new
- 1—SULLIVAN 105 Air Compressor mounted on 1935 Ford Truck
- 1—CMC 3½S Concrete Mixer, new
- 1—CMC Radial Saw, new

WIRE, WRITE OR PHONE:

**T. E. Potts Equipment Co., Inc.**  
2660 Sheridan Drive, Buffalo 17, N. Y.  
Phone DELAWARE 2200

## FOR SALE

- 2—McCoy Rock Dozers for D8 Tractors. Pioneer 4' x 10' scalping screen. R.P.B. Junior Model T Breaker mounted on army ½-Track truck.
  - 1—D8 Caterpillar Tractor with PCU. Serial No. 2U2608. A-1 condition.
  - 11—13 Cu. Yd. Bottom Dump Euclids, bought new 1946 and 1947. 7 with GMC engines and 4 200 H.P. N.H. Cummings engines. A-1 condition.
  - 1—Grout Outfit with 7 x 3 x 10 G.D. Grout pump and 3 tractors and agitators.
  - 1—G.D. 115 Ft. Stationary Air Compressor, powered by 25 H.P. Electric Motor.
  - 1—Gorman Rupp Highway Presser Pump. Model C5414, powered by Chrysler Engine.
- ALL SUBJECT TO PRIOR SALE**  
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## TRUCK MIXER

- 1—JAEGER Model 4HC High Dump Truck Mixer, 4 yd. capacity, mounted on Autocar Truck. PRICE COMPLETE, \$3,500.00.

**FURNIVAL MACHINERY CO.**  
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- 1—Studebaker 6x6 with 5th wheel, 30,000 lb. winch, built-up springs, air brakes
  - 1—Model 200 Osgood ½-yd. dragline, 1946, good condition, 50' of boom and a dragline bucket
- JACK WELCH CONSTRUCTION CO.**  
Hopkins, Minn. Phone HOPKINS 7604

## FOR SALE

- 1—New electric 100 H.P. Reliance 1200 R.P.M. together with starter switch, (\$1,500 complete)  
All subject to prior sale.
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**CHICAGO PNEUMATIC**—500 cu. ft.—Late Models—Caterpillar D 1300 Engines, Pneumatic Tires—EXCELLENT CONDITION.

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All this equipment less than one year old  
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**Marion 382 Shovel (2C.Y.)**  
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Shovel Purchase New in Dec., 1941

**\$20,000.00 or to the best offer**

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- 1—12' Adams grader.
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- 1—Used Buckeye Model 70 dragline and shovel.
- 1—Used Allis-Chalmers Model E-60 power unit.
- 1—Used "Caterpillar" D4 tractor with La Plant-Choate bulldozer.
- 1—Used LeTourneau Model D scraper.
- 1—Novo traffic line marker.
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Various size pumps, gas engines, rotary scrapers, and slip scrapers.
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LeTourneau 12 yd. scoop  
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2—Allis-Chalmers Model L tractors  
Allis-Chalmers HD7 and dozer, 1,000 hrs.  
Allis-Chalmers—HD 10 tractor and dozer, 500 hrs.  
Bay City shovel, cheap  
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Pile driver  
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200—Crawler cranes. Any size, any make.

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Priced to sell at a real bargain.

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ALL IN NEARLY NEW CONDITION  
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Several hundred feet of Gates 26-W cement placement hose, original wrapper, 163 1/2' lengths. per ft. \$1.32  
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LIMA 1201 Diesel shovel, No. 4139. Bought new April, 1947. Has 32' 6" boom, 22' sticks and 3 cu. yd. bucket. Cummins 227 H.P. diesel engine, air controls. First class condition. Used one season. Factory list price \$76,000.00. Our price f.o.b. cars Tenn, \$32,500.00. (90 per cent new.)

PARSONS ditcher, Model 310, ser. No. 1576, excellent condition. \$7,000.00.

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- One—Buckeye Model RB Finegrader
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- One—La Plante-Choate Model C86 Scraper
- Three—1/2 yard Badger Shovels
- One—1/2 yard Osgood Shovel
- One—Jaeger Model C520 Concrete Spreader
- Three—Terra Cobras, Wooldridge 15-yard
- One—Jaeger Model BP2A Bituminous Paver
- One—Cedar Rapids Traveling Roadmix Machine powered with Caterpillar D-13000 Motor
- One—Caterpillar Tractor RD-7 with Bulldozer

### Northwestern Engineering Company RAPID CITY, SOUTH DAKOTA

## ROD BENDERS DUMP CARS DUMP BUCKETS

- 50 New Hinman Bar Benders No. 4—complete with full set U forms
- 33 New Contractors Tip-over Buckets, 42 Cu. Ft. Capacity.
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Prices considerably below manufacturers present selling prices.

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Many good used trucks; also reduced prices on dump bodies.

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- 1—Hvass 50 Ton Trailer w/Hard Tires
- 1—M.S. Sabler 1 1/2 Dipper
- 1—P-H-255A Boom and Dipper Stick less Bucket
- 1—Byers 3/4 Dipper Bucket less Teeth
- 1—Fairlead for Link Belt Model LS-50
- 1—Pile Driver for Link Belt LS-50 w/24 ft. Leads
- 1—Set, Travel Gears for Lima Model Paymaster
- 1—3-Page Dragline Bucket, used
- 1—Fairlead for Model LS-40 Link Belt
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- 2—Crane Lugging for 255A P-H
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- 1—L.S.K. 45 Shovel Front for Link Belt less Bucket
- 1—Burch Belt Conveyor 25 ft. long, new
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- 1—Shovel Front for Byer Model 65
- 2—Fairleads for Lima Paymaster
- 1—Fairlead for Northwest Model 105
- 1—P-H Shovel Front for Model 655A
- 1—Set, P-H Dipper Sticks for Model 655A
- 1—Undercarriage Complete for P-H Model 655A
- 1—Each—Boom Drum, Crowd Drum and Hoist Drum For Above
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- Also Swing Drums, Swing Shaft Complete for P-H-655A
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- A large assortment of Lugging for Shovels up to 2 yd.

The Above List Is Like New—Priced to Sell

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1—Blaw-Knox Concrete Spreader, Serial No. SA-3261, 10-15 ft. adjustable width with vibrating attachment and 4 airport wheels.

1—Blaw-Knox Finishing Machine, Serial No. XC-2200, double screed, 10-15 ft. adjustable width, with tamping attachment.

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These are late model machines, in excellent working condition and can be purchased at a highly attractive figure.

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Practically New—equipped with blade and rake.

### REO 31T Tractor with Freuhauf Low Bed Trailer

Complete equipment for heavy hauling. Good condition. Equipped with winch and sanders. 1948 Reo Model 31T, 1100 x 22 tires—"Z" tag. Trailer Freuhauf FW—semi—8 wheels 750 x 18 tires.

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One Koshring 34-E Dual Drum Power, Waukesha Engine, 35 boom, bucket, complete ready to run.

Address inquiries to

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Northwest 105 crane, 60' boom, Hi Gantry. Good condition, \$3,000.  
 Bucyrus-Erie 1 1/4 yd. shovel & crane. Condition good, \$3,500.  
 Lorain 60, 1 yd. with 1 yd. clam bucket, 60' boom, \$3,300.  
 International TD-9 with 1 yd. front end loader. Loader in good condition, \$3,800.  
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 Universal, portable 9 x 36 with set of rolls, crushing plant complete, \$5,800.  
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 D4 with Taxcivator, 1 yd., \$2,500.

Also some portable washing and crushing plants, 2 and 3 1/2 yd., \$4,500.  
 Galion 101 motor patrol. Like new, \$4,000.  
 Cement block machines. Will sell cheap.

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 1—International TD-9  
 1—International TD-9 with Hughs-Keenan Loader  
 1—International T-10  
 1—Allis-Chalmers Model K with Baker Hydraulic Dozer  
 Used Wheel Tractor  
 1—International TD-9 with Ottawa Loader & Trojan Dozer  
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 Dragline Bucket, New  
 Erie 3/4 yd.

**A. E. HUDSON COMPANY**  
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1 Buffalo Springfield 10-ton—  
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1 Huber Tandem 8-12 ton  
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Diesel truck tractor and 50 Ton Low  
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LIMA PAYMASTER, Model 34  
 Less than 500 hours operation  
 Cummins Diesel—45' Boom  
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USTRAC Tractor with Angle Dozer Blade  
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 Chicago Pneumatic, 315 CFM, on rubber, serial 34048, rebuilt.....\$1,650  
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 Caterpillar, R5, with hydraulic angle blade, 4H series, rebuilt.....\$4,000  
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 Caterpillar D 6-60, LeTourneau Power Control Unit Cable Bulldozer, rebuilt 5H series.....\$7,000  
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 International TD9 Hydraulic Angledozer, TDC-B882, good condition.....\$3,800

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 COAL STRIPPING SHOVELS  
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1—Marion Electric Shovel Model 151M, 5 cu. yd. bucket, 45' boom, 33' stick, also standard boom 38' with 6 cu. yd. bucket, excellent condition.  
 2—54B Bucyrus Erie Shovels, 2 cu. yd. buckets, 45' boom, 32' stick both less than one year old.  
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 1—4 cu. yd. Esco Coal loading bucket for Model 80 Northwest Shovel.  
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 2—2 1/2 cu. yd. Esco Coal loading buckets for Model 6 Northwest Shovels.  
 1—2 cu. yd. Daniels Murtaugh Coal loading bucket for 1 1/4 to 2 cu. yd. Lorain Shovels.  
 Also numerous dozers, graders, locomotives, drills, brooms, etc., adaptable to coal stripping and construction work.

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Army Diamond T. Truck 6x6 Front Winch with Cab like new, \$2,500.  
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2—Le Tourneau Front PCU Model FT-D7  
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 2—D7 with Dozers and scrapers.  
 We do equipment moving—give us a call.  
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BUCKEYE C-15 Ladder type with cast buckets, rooters 20' Deep, 42" wide. Twin City 4 cyl. motor. Machine in new condition, will stand rigid inspection. F.O.B. cars \$5,250.00

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3—3 wheel 10 ton Gas. Powered Rollers, 20" rear rolls, hydraulic scarifier. Good running condition. Cheap.

1—8-10 ton Tandem Roller gas powered. Good running condition.

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1—Blaw-Knox 1 1/2 yard Material Bucket, used.  
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 1—Set Sticks, Model 655 "P&H" Shovel, new.  
 1—Set 33" Manganese Track Shoes, Model 655 "P&H", new.  
 1—Set Drum Laggings, Model 655 "P&H", new.  
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1—Jaeger Model 16 SW, 3 bag concrete mixer, 90" Skip—batchmeter water pump mounted on 4 pneumatic tired wheels. Price F.O.B., Cairo, Illinois, \$2,300.00.

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 General Contractors CAIRO, ILL.

**FOR SALE OR RENT**

1 RD6 Caterpillar with dozer.  
 2 Late model Caterpillar 12 patrols.  
 2 TD9 International front end loaders.  
 1 27-ton LaCrosse low boy machinery trailer.

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In operation at present with approximately 100,000 tons on order; located in southern Illinois on the Illinois Central Railroad with favorable competitive position for furnishing crushed stone and lime in southern Illinois, western Kentucky and western Tennessee; has facilities for loading directly into railroad cars from the bins. This modern plant and equipment will crush 150 tons per hour. All the stone in the quarry is clean from dirt seams and passes the test for all uses. There has been about three million tons removed from this quarry. At present we are working a 100 foot face. Situated between Cairo and Anna, Illinois near Ullin, Illinois. This plant recently became the property of the present owner because of the dissolution of a large corporation in Kentucky and as the owner is inexperienced in the rock crushing business he wishes to dispose of this plant at a sacrifice. Contact Tom Ballard or John Hamilton, phone 3926, Bardstown, Kentucky, if interested.

## FOR SALE

- 1—N.W. Model 25 shovel used 300 hours
- 1—Model Haiss loader on Crawlers. Reasonable
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- 1—D8 "Caterpillar" with LeTourneau angledozer and DDPUC. Used 100 hours. \$14,500.

### M. C. BURT EQUIPMENT CO.

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Asphalt Batch Plant, 16 cu. ft. Kwik-Mix Asphalt Mixer complete with gasoline air cooled engine, 16' ladder extension mounted on pneumatic tires.

Loader Scoopmobile 3/4 cu. yd. mounted on pneumatic tires.

Timbers and planing to erect hoppers. Equipment in excellent condition.

All for \$6000.00 F.O.B. Washington, D.C.

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HD 7 Allis-Chalmers bulldozer  
GMC tractor and lowboy.

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International Diesel Motor P.D.40 with enclosed clutch and V-belt pulley. \$750.00.

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1 MOBILIFT 2000 LBS. rated Capacity; perfect Condition; Sacrifice \$1,000.

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## FOR SALE

- 1—"Caterpillar" D2 and Traxcavator. Good condition .....\$3,500.00
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- 1—"Caterpillar" diesel No. 10 tandem motor grader, nice condition, good tires. ....\$2,700.00
- 1—D13000 Engine Replacement for D8 tractor. Rebuilt.....\$1,950.00
- 1—"Caterpillar" D6 tractor, late model, with angle-dozer. Excellent condition. ....\$6,900.00
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PORTABLE PIONEER PRIMARY CRUSHER JAW UNIT—Trailer mounted with hitch Model 1941 Serial G-571 Factory No. 1833 Order No. 53885 Crushing Jaws 36" wide 54" deep Flat belt drive with two drive pulleys 50" diameter 12 1/2" face equipped with two axles and 6 dual wheels 20" rear wheels Tandem mount 12-tires heavy duty 10.00 x 20" 12 ply and tubes Hydraulic brakes rear wheels only Weight approximately 15 tons 8 1/2' wide 24' long 14' high with one 12' section conveyor.

Four deck Vibrator Screen 48" x 12' long Mesh 1/4" to 2" Power Unit—1 Model RD-8 Caterpillar Diesel Engine Skid Mount Serial No. 1H822 6 Cylinder water cooled with 2 Cylinder gasoline starting engine and power take-off Flat pulley right angle pulley size 14" diameter 15" face U.S. No. 108-25083 Size overall—46" wide 138" long 72" high. This Unit was manufactured by the Pioneer Engineering Works, 1515 Central Avenue, Minneapolis, Minnesota. It is now located at the Pioneer Engineering Plant where it was overhauled. Contact W. O'Brien, Parts Manager.

PORTABLE PIONEER SCREENING SECONDARY CRUSHER JAW UNIT—Trailer Mounted with hitch Model 1941 Serial C-582 Factory No. 6P3835 Crushing jaws 37" wide 22" deep Flat pulley drive with two drive pulleys 50" diameter 12 1/2" face with two axles and 6 dual wheels 20" rear wheels 12-tires heavy duty 9.75 x 20" 12 ply and tubes Hydraulic brakes rear wheels only hand lever control Also mounted with Secondary Crusher Jaw, one crusher roll Model 1941 Factory No. 30111 17 1/2" wide 30" diameter flat belt drive with drive pulley 40" diameter 10" face.

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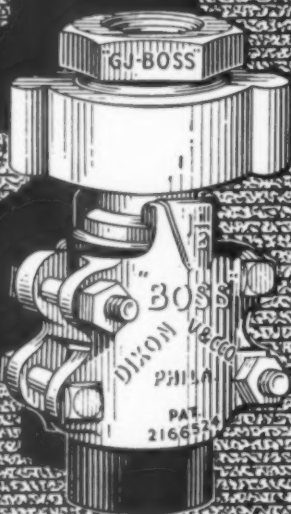
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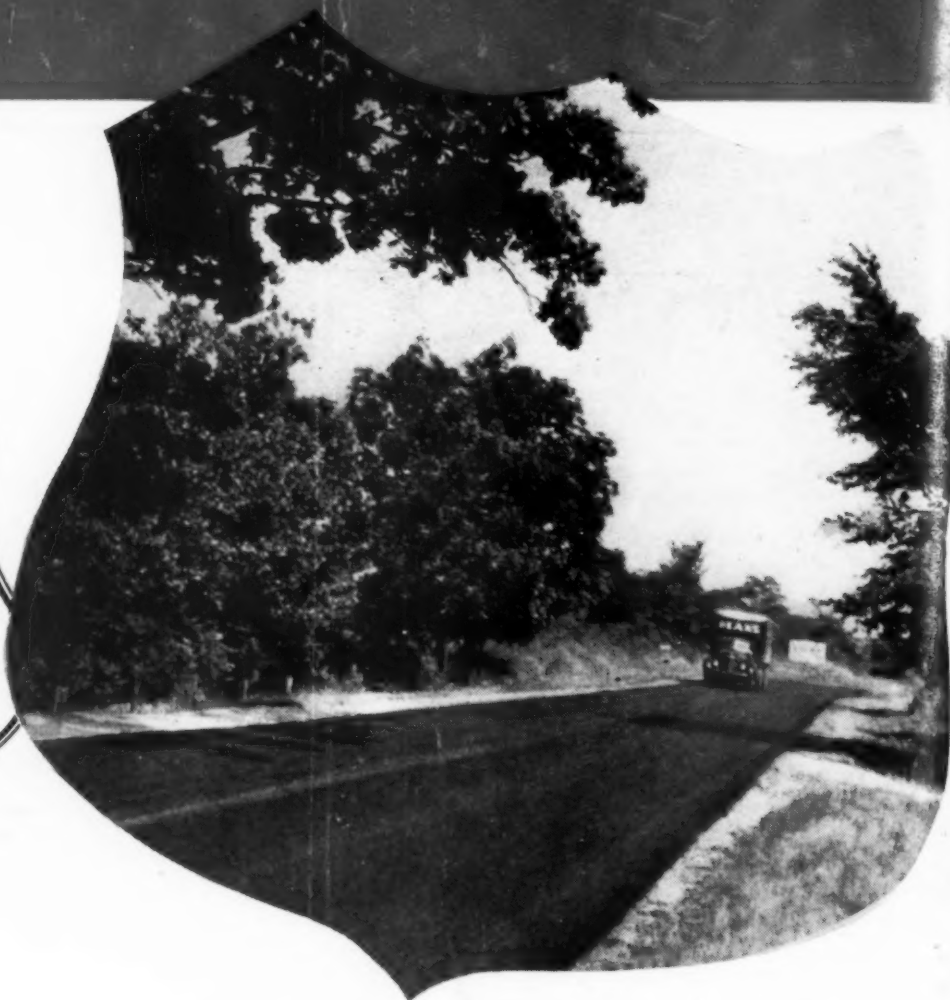
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